OCTOBER 1959

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Plant and Power Services Engineer

CENTRALIZED LUBRICATION

How, When and Where to Profit by It

WILLIAM A. BROWN, JR. (left), Vice President Stewart-Warner Corp., talks about the "modern" approach to this plant service

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THAT'S INTERESTING

Rubberless tire takes to air

No rubber, fabric, or inflation can be found in a new tire being manufactured by Goodyear Tire and Rubber Company.

The unique tire, designed for space flight, is made of wire and will withstand temperatures of up to 1,000° to 2,000°F in flight and during landings. It is designed for use as a landing wheel and tire for vehicles which pass through the thermal barrier on their re-entry into the airmass.

Advantages of this wire construction are: better ability to absorb runway irregularities and landing impact; greater total contact area; better scavenging action because of wheel rotation; better cooling of the pad surface and better directional stability.

The breaking point with a bang

High explosives are being used to determine the breaking strength of metals with a high degree of "give" by a metallurgy group at Harvard University.

Values for the previously unknown fracture strengths of such extremely ductile metals as high purity aluminum which stretch instead of snapping if pulled apart slowly have been measured.

An intense compression wave may be created by exploding a cylinder of explosive on one side of the plate. The compression wave travels through the plate, and when it reaches the free surface, echoes back as a tension wave which tends to pull the plate apart. When this tension exceeds the strength of the plate, it fractures. The strength of the metal can be calculated from the distance back from the end of the rod at which the break occurs.

Sept. 28-Oct. 1: American Welding Society Fall Meeting; Sheraton-Cadillac Hotel, Detroit, Mich.

Oct. 5-8: Northeast Regional NACE Meeting; Baltimore, Md.

Oct. 6-9: Stanford Research Institute International Symposium on High Temperature Technology; Asilomar, Monterey Peninsula, Calif.

Oct. 7-9: ASME-AIME Solids Fuels Conference, Cincinnati, Ohio.

Oct. 12-14: 1959 National Electronics Conference; Hotel Sherman, Chicago, Ill.

Oct. 12-15: South Central Regional NACE Meeting; Denver, Colorado.

Oct. 22-23: 15th Annual National Conference on Industrial Hydraulics; Hotel Sherman, Chicago, Ill.

Oct. 29-30: 1959 Electronics Devices Meeting; Shoreham Hotel, Washington, D.C.

Oct. 30-Nov. 1: American Society of Refrigerating Engineers Semi-Annual Meeting; Traymore Hotel, Atlantic City, N.J.

Oct. 30-Nov. 2: Refrigeration Service Engineers Society Annual Meeting; Atlantic City, N.J.

Nov. 2-5: 11th Annual Exposition of Air Conditioning and Refrigeration Industry; Convention Hall, Atlantic City, N.J.

Nov. 2-5: National Metal Exposition; Morrison Hotel, Chicago, Illinois.

Nov. 4-6: American Nuclear Society Winter Meeting; Sheraton Park Hotel, Washington, D.C.

Nov. 5-6: Eighth Annual Instrumentation Conference; Louisiana Polytechnic Institute, Ruston, La.

Nov. 9-13: National Electrical Manufacturers Association Annual Meeting; Traymore Hotel, Atlantic City, N.J.

Nov. 23-24: Instrument Society of America Symposium; Ben Franklin Hotel, Philadelphia, Pennsylvania.

Nov. 29-Dec. 4: ASME Annual Meeting; Chalfonte Haddon Hall, Atlantic City, N.J.

Dec. 1-4: National Warm Air Heating and Air Conditioning Committee Meetings and Annual Convention; Chase Hotel, St. Louis, Mo.

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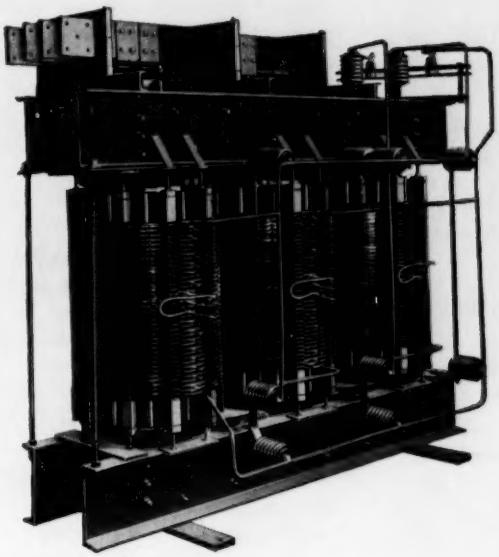

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Specifically speaking about this issue

"We burned out motors like crazy," reports plant engineer E. D. Bunyea of the H. P. Smith Paper Company when referring to his company's asphalt mixing operations. The asphalt, when it isn't soft enough, overloads the mixer motor terrifically, and motor replacements at $130 each were frequent.

By replacing conventional flexible couplings with one of the dry fluid type, motor burn-out and downtime losses were eliminated completely. The coupling is a torque-limiting device that slips during startup and protects against any damaging overloads. The torque capacity is easily adjusted to provide extra-gentle start or, in this case, high torque starting capacity.

SAVING MOTORS

You will get a complete idea of what these couplings look like and what they can do by reading Mr. Bunyea's article on page 17.

Costs of new equipment and machinery are at an all-time high, and, therefore, it is important that they be profitably productive over longer periods of time.

One way to increase the productivity of machinery is to make sure that lubrication schedules are adhered to. Even under strict supervision, manual methods may sometimes go astray. One way to get by this is to adopt the "modern" approach to this plant service — that of centralized lubrication. "How, when, and where you can profit by centralized lubrication" is the subject of this month's cover story. William A. Brown, Jr., Stewart-Warner vice president and general manager of the Alemite and Instrument Divisions, covers the subject quite thoroughly in his article which starts on page 19. Schematic diagrams and complete descriptions of four systems are presented.

LUBRICATION

The plant engineering staff of Armour's McCook plant set up some pretty stiff requirements for a steam trap on the heating systems of a wide variety of equipment. The trap would have to do a top-notch job of venting air and draining condensate as rapidly as it formed, be strong enough to simplify installation, and require little or no maintenance. In addition, it would have to handle various steam pressures without adjustment. Story on page 18 tells what kind of steam trap met all these requirements of the chemical plant.

VERSATILE TRAPS

How to have a trouble-free aluminum cooling tower was demonstrated by the six-year test program set up at the Continental Can Co. Building in New York City. The program showed proper procedure for water treatment and maintenance to assure trouble-free performance in a location where serious corrosion problems were expected. By solving these problems, the building was able to have a cooling tower without exceeding roof's load-bearing limits.

ALUMINUM TOWER

If your bearings are getting too hot, you will be interested in how Allied Chemical racked up a $40,000-a-year saving by using thermistors to monitor bearing temperatures. The devices give continuous over-heat protection via a remote-reading instrument system, and reduce cooling-water consumption, increase lubrication life and decrease manpower costs. Story on page 24 tells how the devices were used in the power houses.

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W. A. Countryman

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VOLUME 1 NUMBER 6
(as Plant and Power Services Engineer)

Plant and Power Services Engineer

Serving the key engineers and consultants who are responsible for both plant services and power services throughout all industry, in utilities and large public service installations and buildings.

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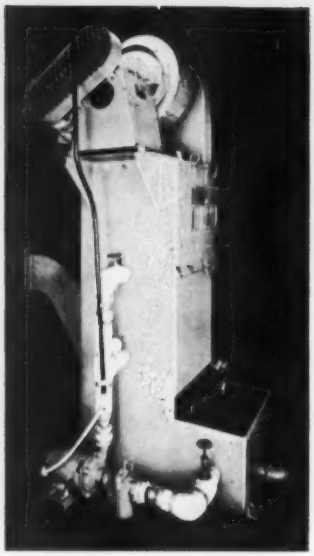

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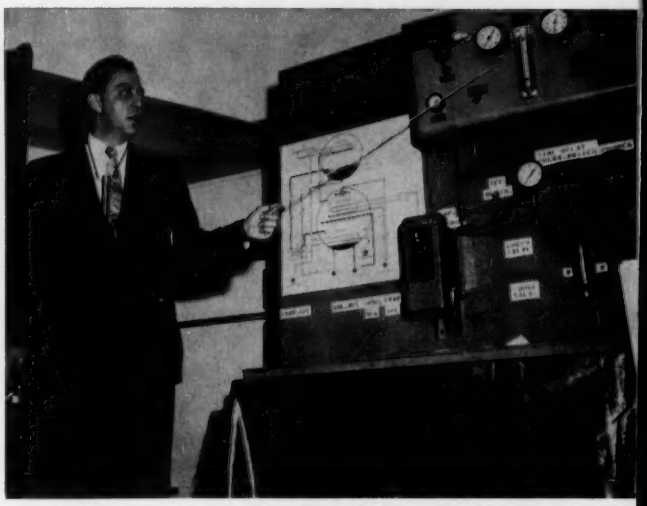

On-the-job training is offered by air conditioning equipment manufacturers to their customers

Many ways are open for gaining air conditioning know-how

Are you getting the utmost in operating efficiency from your air conditioning equipment?

If not, the problem may be lack of knowledge about a minor part of the system. Perhaps, now is the time for a refresher course for you or your operators.

Training programs for operating personnel and service-maintenance contracts for customers — both designed to fit the needs of virtually any customer and his system — are offered by most air conditioning equipment manufacturers.

One such manufacturer is Carrier Corporation.

Commenting on the various programs offered by Carrier, William J. Wren, of the Service Engineering Department, reports that one of the most important is an on-the-job skull session designed to instruct customer personnel in the best operating procedures for their own system. This program is given at the time of start-up and may last up to two weeks, depending upon the complexity of the installation.

Subjects include: operating procedures and techniques, maintenance and service diagnosis, and a theory of the machine's operating cycle. A complete set of printed instructions supplements on-the-job teaching.

Another type of program, he reports, is not as intensive, but it does serve as a good refresher for previously trained operating personnel as well as a basic course for new men. This is held in school form at strategically located regional centers across the country.

In these sessions, general operating techniques and proper maintenance procedures for all major products are covered.

Instruction is concentrated on methods applicable to the area in which the school is conducted.

Recently, 276 operators representing 137 major companies completed three two-day

sessions in New York City, Boston and Syracuse. The trainees were all operators of newly installed systems using absorption and hermetic centrifugal water chilling machines.

Instruction in the operation and care of the apparatus was presented by Carrier service personnel from the northeast region, and by representatives of water treatment companies in the three cities.

Still another training program can be presented on the customer's premises. This differs from on-the-job training in that the building owner, manager and members of the architectural and consulting engineering firms may attend along with operating personnel. These sessions last one to three days, depending upon the size of the group and the system.

Instruction can be tailored to meet specific problems. Subjects include: fundamental psychrometrics, analysis of the refrigeration cycle, procedure for year-round operation, theory of operation and an explanation of the function of individual parts. A thorough examination of the customer's system rounds out the program.

Contracted know-how

Maybe you're one who prefers to "farm out" his maintenance and service work to insure the investment in an air conditioning system? For you, Carrier has developed two maintenance-service contracts.

The first is a planned-inspection service contract. This assures top-to-bottom inspection of the system at prescribed intervals and during a shutdown period.

Any items that need immediate attention are corrected upon receipt of the customer's approval. Recommendations for necessary repairs that can wait unit shutdown are included in an inspection report. Instruction of operating personnel is accomplished by suggesting better operating techniques and calling attention to breakdown causes.

The second is a planned-maintenance service contract, which assigns complete responsibility for maintenance of the system to the manufacturer. (Operation is still the responsibility of the customer, however.) This program provides for regular inspection of the system apparatus. All necessary adjustments, replacements or repairs are made at that time. Instruction of operating personnel is integral part of the contract.

(A brochure furnishing a general description of the Carrier planned service program is available on customer request from Carrier Corporation, Dept. P&PSE, Syracuse 1, N.Y. Ask for Brochure No. AC356. More detailed information can be obtained by contacting Carrier offices around the country.)

Develop new process to produce titanium

A new process to produce titanium by electrolysis has been developed by a Norton Company research team.

Titanium carbide forms the anode of the electrolytic cell with the pure titanium crystals adhering to the cathode. Process is carried out at a temperature of 900°C, and in an argon atmosphere because of titanium's affinity for oxygen and nitrogen.

In the pilot operation, the cathode is retracted into an argon-filled gas-tight chamber above the electrolytic cell. The chamber serves as a cooling area and as an "air lock" through which the batch is removed.

Direct current is applied to the cell at 4 volts, 800 to 1000 amps, with 8 to 10 kwh required per pound of titanium.

Because of the relatively low cost of titanium carbide it is believed that the process will produce titanium metal of high purity economically.

How to determine men needed for maintenance

Faced with the ever-present problem of equipment maintenance, how do you decide whether to: leave the equipment alone; have one man service it; or have a series of men service it?

An Air Force report which provides guidance for analysis of this problem has just been released to the public through the Office of Technical Services, U. S. Department of Commerce.

The simplified analysis is based on the use of probability theory to study the assignment of maintenance men.

Decision to use no men, one man, or more than one in sequence is shown to depend on what are called the initial condition parameter (probability that the equipment will operate), the repairing skill parameter, and the skill difference parameter (the differences within an individual man, or what the authors call the "foul-up-fix-up" factor).

The simplest case considers only one type of equipment and one type of maintenance man — one "homogeneous in skill level." The analysis is also extended to more complicated cases involving a pool of maintenance men with "heterogeneous skill levels."

An important finding was that the initial condition parameter becomes less and less influential as the number of men in the series is increased. Put another way this means that the functioning of the equipment ultimately depends on the skills of the service men.

Analysis technique is described in PB 151683 "Equipment Maintenance with Various Numbers of Service Men: A Simple Analysis," G. O. Wright and others, Wright Development Center, U.S. Air Force. The 41-page report may be ordered from OTS, U.S. Department of Commerce, Washington 25. Price is $1.25.

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Plant Power Services Engineer

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To: The P. and P.S. Engineer* (meaning you)

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The Editors

*Power Engineer, Chief Engineer, Services Engineer, Plant Engineer, Utilities Engineer, General Engineer or whichever of the many other titles you go by as a person responsible for the plant and power services in your company.

REPORTS IN BRIEF

Report small chance of permanent contamination in atomic plants

GE scientists say there is very little chance of atomic-age power plants being put out of commission by permanent radioactive contamination from defective fuel charges.

Their report to the American Nuclear Society was based on a series of recent tests conducted in GE's Vallecitos boiling water reactor. Only two of 500 fuel segments irradiated in the reactor since late 1957 have failed. In both cases the rupture affected only one segment from a total of 18 in a fuel assembly bundle.

Both segments, which contained high-density uranium dioxide pellets, were of preliminary design, the scientists said, and fabrication processes are being improved to the point where fuel element failures will be very unlikely.

They reported the fuel failures did not result in permanent contamination of the system and that radioactive carry-over is not a serious problem. Maintenance following shutdown was not limited by the small amount of contamination that did result.

Experiments are continuing using assemblies containing deliberately defective fuel elements to study performance under various reactor operating conditions.

Chemical company operates giant waste plant

Incorporating the newest concepts in industrial waste control, a six-acre incineration plant built at a cost of $2.25 million has been placed in operation by Dow Chemical Co. in Midland, Mich.

This latest addition to Dow's waste treatment plants increases that company's capacity to handle the equivalent of sewage from a city of 300,000 persons and the refuse of a city of 70,000. The refuse capacity could be easily doubled if necessary.

To keep air and water pollution from the Dow plant "under rigid control", the plant can dispose of a quarter-million pounds of refuse and tars daily.

More than 250 truckloads of liquid waste tars are produced in the chemical plant weekly, plus 1700 drums of semi-liquid and solid waste chemicals and 17,000 cubic yards of other refuse per month.

The overall plant — believed to be the largest industrial waste plant in the world — consists of, in addition to the incineration plant, a $5 million biological waste treatment plant and a $2½ million brine wastes facility.

More acreage is devoted to waste disposal at the Midland plant than to manufacturing operations.

To build refractory metals research center

A fully equipped metallurgical research center to speed development of high temperature metals for jet engines, rockets and missiles, atomic power generators, and other "hardware" of advanced design, will be constructed by Du Pont at its Baltimore plant.

The installation will contain equipment to forge, extrude, roll, draw, and heat treat such refractory metals as niobium, tantalum, titanium, zirconium, tungsten, and chromium.

It will be capable of producing mill products—ingots, tubes, rod, sheet, strip, and foil —for sales development programs.

Construction of the facility is an outgrowth of E.I. du Pont's pioneering work in the development of titanium metal and its expanding development program in pure niobium metal and niobium alloys. Initially, the Baltimore unit will concentrate on these two metals.

Niobium alloys have possibilities for obtaining improved high temperature performance from equipment used in the chemical and petroleum industries, metallurgical operations, and in power generation.

Equipment in the new Du Pont installation will include forging and extrusion presses, a hot and cold rolling mill, various furnaces, and a wide range of auxiliary and laboratory equipment.

GE to study nuclear superheat for AEC

A $2.7 million study proposal by GE for increasing the efficiency of nuclear power plants by superheating steam has been selected by the AEC for contract negotiations.

The nuclear superheat program will be carried out at GE's San Jose facilities and its Vallecitos Atomic Laboratory.

Superheating methods will be sought to reintroduce the saturated steam from water-type reactors to a nuclear heat source to boost its temperature above the saturation temperature.

An increase of about 10 percent in the efficiency of the original energy conversion is expected in the superheating process, thus permitting future expansion of the kilowatt output of nuclear power plants while simultaneously reducing capital cost of turbines and auxiliary equipment.

Also included in the superheat program are studies on reactor design and power cycle analysis, fuel and materials technology analysis and development, experimental physics work, as well as coolant chemistry and radiation carryover analysis.

Start program to test power reactor steels

U. S. Steel and GE have begun a program to develop improved steels for use in nuclear power reactors. The program constitutes the first large-scale investigation of radiation effects on steels to be carried out in a private test reactor and wholly financed by private industry.

Corrosion resistance of a wide variety of steels is being investigated under conditions simulating those in actual boiling-water reactor service. Specimens are being exposed to hot water and steam in high-pressure autoclaves and in corrosion test loops at GE's San Jose facilities to determine quantitatively the rates of corrosion.

Steels which exhibit superior corrosion resistance in these screening tests will then be exposed in the GE Vallecitos test reactor under the actual operating conditions of corrosion and radiation.

In another phase of the program, just getting under way, the effects of high-intensity neutron irradiation on the properties of reactor pressure-vessel steels will be studied in the test reactor.

Steels under study include both those currently used in reactor pressure-vessel construction, and higher strength alloy steels that would offer important advantages in respect to economy and reliability.

Reports corrosion research by Bureau of Standards

To provide science and industry with solutions to some of the practical engineering problems encountered today, the National Bureau of Standards is investigating the primary processes of corrosion. Large single metal crystals are employed in some of the research to correlate corrosion with the arrangement of atoms in the crystal lattice. The role played by electrical phenomena and cathodic protection comprises a phase of the program.

One Bureau study deals with the nature and mechanism of formation of oxide films on metal surfaces. The effect of illumination on the corrosion reaction has also been studied. By attacking the problem from different directions, the Bureau's corrosion research staff hopes to improve present methods for combating corrosion.

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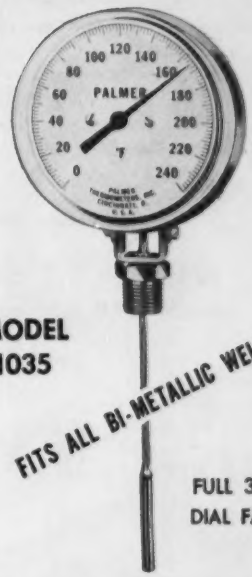

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Why not lease coal-burning equipment?

Acquisition of boiler plant equipment by lease can be a new answer to an old management problem related to coal burning. Coal's prevailing price advantage over competing fuels is a substantial attraction in many areas. On the other hand, the initial cost of coal equipment is often higher. Given a reasonable time, coal cost savings wipe out the equipment cost differential and begin producing net gains that continue throughout the life of the plant. The management dilemma crops up when a company insists on a short-term payback on a capital investment in boiler plant equipment.

Equipment leasing sidesteps this payback requirement because no capital investment is involved. Operation of a coal-fired plant allows management to benefit from the lower cost of coal and thereby to enjoy substantially lower operating costs.

An alternative method, partial leasing, may be attractive to companies that are more rigid about exercising the payback principle.

Under this plan, management purchases equipment common to both coal and oil-fired plants, such as boilers, combustion controls and piping. It then leases the equipment peculiar to coal use (stokers, coal and ash-handling equipment).

This eliminates the difference in capital investment between the two plant types, and the nominal rent for the specific coal components purchases the right to all savings from the use of coal.

Annual equipment charges (depreciation, interest, taxes and rent) for a partially leased coal-fired plant are said to be about one percent greater than for a purchased plant.

There are other financial advantages to the leasing plan. Equipment rental does not tie up working capital as outright purchase does. Also, contracting to lease equipment differs from borrowing money for purchase in this important respect: as an operating expense, the yearly equipment rent has little effect on the ratio of current assets to current liabilities, whereas a loan for purchase substantially increases company indebtedness.

The status of leasing in accounting procedures also offers special advantages to public school boards and other municipal bodies. They usually control operating expenditures, but the decision on a capital investment that increases municipal indebtedness must be referred to the voters. The lease method enables a community to modernize or install new boiler plants while operating comfortably within its legal bonded indebtedness.

(Complete study on "Leasing of Coal-Burning Equipment" is available from Bituminous Coal Institute, Dept. P&PSE, 802 Southern Bldg., Washington 5, D. C.)

Circle 9535 inside back cover.

Sets up nuclear lab for outer space work

An astronuclear laboratory where scientists will work on the development of nuclear energy for outer space has been announced by Westinghouse.

The lab will be part of a new Westinghouse atomic power division that will include existing activities of the company in development of commercial applications of atomic energy for electric power generation.

Welded steel tubing for heat exchangers

After five years of extensive field tests, Babcock & Wilcox' Tubular Products division has marketed a new welded steel tubing. The new line was developed to meet industry's need for an electric resistance welded carbon steel tube of uniform strength, dimensions, and properties, and which is easily workable and less costly than seamless tubing.

A vital phase of the production and control process for the new tubing is the use of newly developed ultrasonic testing devices to provide a continuous and automatic check of the weld as it is made.

Another advantage claimed is the automatic removal of the weld flash, or bead, from the entire length of the tube during fabrication. This improves corrosion resistance and flow properties. It also permits alteration of the tube length in the field, eliminating the necessity for flash removal by the user.

A continuous normalizing heat treatment process is used, following the weld operation, to eliminate differences of grain structure between the weld and the body of the tube. The heat treatment "homogenizes" the grain, at the same time providing uniform ductility for easy bending, "rolling-in" and other field work.

For the convenience of the user in identifying its source, and to assist the manufacturer to identify the date of fabrication, equipment used, and the strip from which the tube was made, code symbols are assigned to the tubing. In effect, the product literally is "signed" by the maker.

The welded carbon-steel heat exchanger tubes are produced to ASTM specifications. They are made in a complete range of sizes through 4½" outside diameter and in all normally required standard wall thicknesses.

Tubes are for use in heat exchangers and condensers for the refining, chemical, refrigeration and petrochemical industries, and in stationary and marine boilers.

Atomic energy myths

In a recent address before the Nuclear Energy Writers' Association, Dr. Chauncey Starr, General Manager of the Atomics International Division of North American Aviation, Inc., discussed what he called "the mythology of atomic energy."

Dr. Starr said the myths about atomic energy can be placed in two categories, the technical and policy myths.

Dr. Starr went on to say, "The foundation myth of the atomic power program always has been and still is the assumption that atomic power will some day be less costly than the power from conventional fossil fuel plants.

"The usual argument presented to support this position is the prognostication that in twenty-five or fifty years, the limited availability of fossil fuels will raise their costs so high as to eventually make atomic power economically desirable — in fact economically necessary if we are to maintain the present low cost of electricity. Such 'crystal ball' projections depend on now foretelling the energy and fuel situation a half century ahead.

"The principal technical myth which has pervaded our policy on the development of atomic reactor types has been that there is an ideal technical approach which will eventually lead to low-cost power.

"As a corollary of this point of view, there have been, and continue to be, numerous comparative studies and economic analyses of various atomic plant concepts made with the specific purpose of predicting the lowest cost power producer of the future.

"Now unfortunately, the elements of cost which will determine the economics of future atomic power plants involve major intangible areas which cannot be estimated with any degree of accuracy today."

According to Dr. Starr these intangible areas are reliability, maintenance, fuel cycle, natural uranium vs. enriched uranium, breeding, and high temperatures.

Develop silicon transistors to control over 5 kw

High power silicon transistors have been developed by Westinghouse, which, when operated as a switch, are capable of controlling over 5 kw of power.

Transistors are suitable for high power switching and linear power applications since they have the following characteristics: collector-to-emitter voltage ratings from 30 to 200 volts; maximum operating junction temperature of 150°C; and saturation resistance less than 0.1 ohm. With a minimum current gain of 10 to 15 amperes collector current, these devices have a maximum collector current rating of 30 amperes.

Because of the higher temperature capabilities of silicon, one of these transistors can be used in applications that previously required a number of germanium units in parallel.

Units use ultrapure silicon produced by the Siemens-Westinghouse process. They are of n-p-n configuration and use a new case that is specifically designed to take advantage of the high current and high voltage capabilities of the device.

High temp lubricants to be made by Dow

Two Air Force contracts have been awarded to Dow Chemical to produce polyphenyl ethers for evaluation as high-temperature, radiation-resistant lubricants.

Dow will produce 5,000 pounds of the two lubricants which will be given extensive operational evaluation as turbojet engine oils, hydraulic fluids and greases in connection with Air Force developmental engines and hardware.

Dow's pilot plant capacity for the two lubricants will also allow production of developmental quantities for industrial and commercial applications requiring thermally stable, radiation-resistant fluids.

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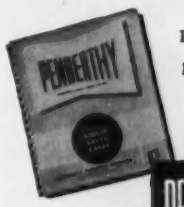

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Circle 9536 inside back cover.

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Circle 9537 inside back cover.

Consumers Power to get nuclear station

Bechtel Corporation has been awarded a prime contract by Consumers Power Company of Jackson, Michigan, to engineer and construct a 50,000 kw nuclear power station on Lake Michigan. GE will supply the nuclear portion of the plant and the turbine-generating equipment. The plant will cost $30 million and is scheduled for operation in 1962.

The reactor will be a direct-cycle, forced-circulation, boiling-water reactor unit and will have as its primary objective the development of engineering and economic data on high power density and high specific power.

Consumers Power will undertake an extensive research and development program on reactor core and fuel design in conjunction with GE. Goal of this program will be to increase the power density to permit an eventual reactor power rating of 75,000 kw.

Radiation monitoring unit for city water systems

A super-sensitive monitoring system has been developed to keep constant check on traces of radioactivity in water supply systems of American cities.

The equipment is connected into the water supply at one or more key points, so that its crystal detector, sensitive to both beta and gamma rays, is exposed to the flow at all times. The detector is housed in a heavy stainless steel-lined three-inch lead shield, to exclude normal atmospheric radiation.

Water flows through the housing continuously. Trace amounts of radioactivity generate a signal which is amplified by a device designed at Oak Ridge Laboratory. This device controls the marking-pen on the chart. The equipment incorporates an analyzer which makes it possible to identify a particular contaminant in the flow.

The system records the small, harmless radiation always present in any water supply or sewage system, and immediately registers any significant increase caused by fallout, rain or leakage from hospital and other scientific or industrial equipment, providing a complete safety and control system.

Two of the units, which are made by Victoreen Instrument Company, Cleveland, were recently delivered to the City of Philadelphia.

Sea water conversion is put "on ice"

Office of Saline Water, Department of the Interior, has issued a report on an experimental program to convert sea water to fresh water by a direct-freezing continuous wash-separation process.

When sea water is cooled to 26°F, the ice that is formed, removed, washed and melted is pure water, just as is condensed steam from boiled sea water. In order to produce a pound of steam from sea water, approximately 1000 Btu are required, but in order to produce a pound of ice from sea water only about 150 Btu must be removed. The objective of a freezing process is economically to freeze the water and to remove the brine from the ice.

In the direct freezing the chilled sea water is sprayed into an evacuated tank whereupon part of the liquid vaporizes and part of the liquid freezes. The vapor is removed continuously and the ice-brine slush is pumped to the wash separating device. The water vapor may be removed by a vapor compressor, an ejector, or an absorber. The direct freezer requires less energy because the "temperature lift" is less than that of a conventional freezer.

The experimental program conducted by Carrier Corporation, has progressed to the point that ice has been produced in the freezer at design rate. Product ice of the freezer-separation column combination has a salt concentration of less than 500 ppm. Operational characteristics of the equipment have yet to be optimized.

The report recommends that the next major phase of the program be a contract proposal for a design study of a complete pilot plant to determine capacity, component design, and control requirements for a system.

Government fuel policies can lead to "disaster"

"Today the bituminous coal industry would find it almost impossible to fill war-time requirements" was the dismal report recently given by Joseph E. Moody, president of Southern Coal Producers' Association and National Coal Policy Conference.

Speaking before a Chamber of Commerce meeting in Bluefield, W. Va., Mr. Moody said that this situation would be a national disaster and that the Government is gambling with national security.

He cites a national fuel policy proposed by leaders of his industry as one remedy. Such a policy would end the dumping of residual oil along the East Coast and the dumping of gas for industrial uses.

Renewing charges that residual oil dumping had displaced coal, he defended the Presidential order of last February which placed quotas on imports of petroleum, including residual.

He also cited a situation where home users of gas are footing the bill for low-cost gas to industry in various parts of the country, saying "The difference in rates (for gas) paid by the householder and some industrial consumers is . . . fantastic."

The bituminous coal industry, he contended, is being placed in a situation which would make the industry unable to meet war-time requirements.

Mr. Moody proposed the formation of a fuels policy committee, comprised of representatives of the coal, oil and gas industries, "looking towards the formulation of a sound national fuels policy."

REPORTS IN BRIEF

Cooling tower tests show algae, wood rot control

Two large cooling towers in Dow Chemical's Freeport, Texas, plant have been undergoing study started in 1950 by the California Redwood Association to determine causes and means of preventing premature failure in redwood cooling towers.

Chlorine, an oxidizing algaecide, is widely used in an effort to control bacteria, fungi, molds and algae that use cooling tower water as a natural habitat.

However, the California Redwood Association reported recently (July, PLANT and POWER SERVICES ENGINEER, p. 11) that chlorine in a cooling tower's circulating water reacts chemically with the wood, making the wood more vulnerable to biological attack, and causing premature failure.

Tests on the Texas cooling towers reveal that non-oxidizing algaecides can increase operational efficiency and reduce maintenance costs.

Combined water inventory capacity of the two towers is one million gallons.

Similar to those used at other Dow locations in power plant and production services, they were studied for eight years as part of the CRA program.

While the technical report on test findings is not yet completed, preliminary results indicate:

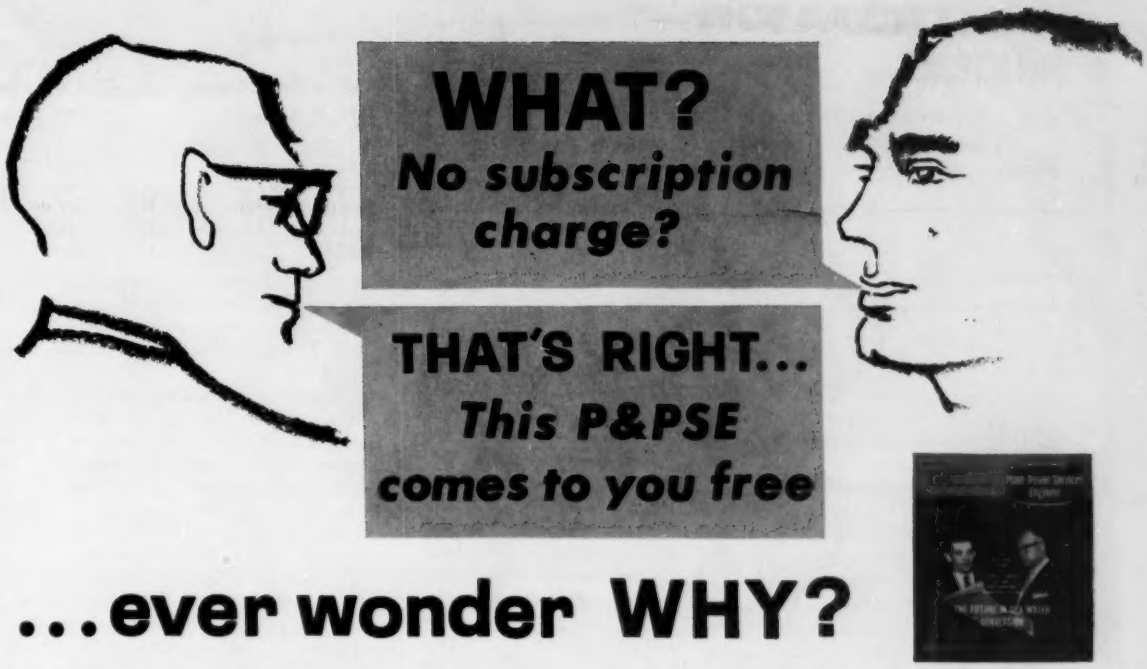
1) The non-oxidizing algaecide does a better job than chlorine of killing microorganisms.

2) Wood is not harmed. On the contrary, the non-oxidizing algaecide treatment has value as a surface disinfectant in inhibiting wood rot.

3) The structure of the tower can be given more complete treatment.

4) Partly because of greatly reduced maintenance costs, a lower total treatment cost was experienced.

The technical report on test findings is scheduled for completion by early fall and will include product information, operational data and maintenance cost comparisons.



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Publishers lose money . . . yes, most business magazines lose money when they sell a subscription — not only because the magazine costs more to produce than the subscription price brings in — but also because the cost of making such sales exceeds the income from $5.00 or $10.00 subscriptions.

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You see, it's the money that comes from advertising that keeps the business magazine publisher in business. So, logically, such advertisers demand best possible coverage of folks like you — the important key engineers who exercise buying power in regards to plant and power services products.

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As you can see, to get the best, most effective circulation coverage, the best way is to "hand-pick" the right readers, then send the magazine to them. In this way, we can direct our editorial efforts solely and completely to serving this "hand-picked" audience.

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PLANT and POWER SERVICES ENGINEER "hand-picks" only qualified readers . . . the key engineers responsible for plant and power services in all kinds of industry, in utilities, in large public and private institutions, and in consulting capacities. Then, the editors make the magazine so interesting, so valuable, these men want to read it.

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ASSOCIATION NEWS

. . . reports of conventions, papers and people from associations of interest to plant and power services engineers

Arc suppression device reported

"Arcing and voltage surges can be controlled with new type arc suppression device without disadvantages of previous methods, according to F. Miller, of the Square D Company, in a paper given at the Middle Eastern District Meeting of the American Institute of Electrical Engineers.

The device is inexpensive, easily applied, fails safe, and will in most cases actually improve contactor performance by giving shorter drop-out times with no effect of pick-up characteristics.

The interruption of current to the operating coils of industrial contactors, presents two problems — erosion and oxidation of the control contacts by the arc produced when the circuit is interrupted; and the puncturing of control wiring and operating coil insulation by the voltage peak developed by the collapsing magnetic field.

Conventional methods of arc suppression will generally control only one or other of the two problems and will have certain inherent disadvantages. They may cause such things as excessively slow drop-out or contactor "bounce," or be polarity sensitive, or they may not fail safe. The new device will control both problems.

Power circuit breaker ratings published

Preferred ratings for power circuit breakers, C37.6-1959, has been published by the American Standards Association. Tables are given for indoor and outdoor circuit breakers for both oil and oilless types. Included are voltage ratings, insulation level, current ratings and interrupting ratings.

ASME elects new head

The American Society of Mechanical Engineers has named Walker Lee Cisler, president of the Detroit Edison Company, to head their organization.

Mr. Cisler who has been closely associated with power industry developments is also actively engaged in furthering the growth of atomic energy as a power source and served as executive secretary of the Atomic Energy Commission Industrial Advisory Group and president of Atomic Power Development Associated, Inc.

Also elected by the Society's nominating committee were four vice-presidents and three directors.

NEMA deplores OCDM decision on imports

The National Security Committee of the National Electrical Manufacturers Association has termed the June 12 decision by the Office of Civil and Defense Mobilization (OCDM) in the case of imports of heavy electrical equipment "unfortunate" and expressed regret that the agency "does not agree with the seriousness of the situation with which we are faced."

In its decision, OCDM ruled that imports of heavy electrical equipment are not a threat to impair the national security.

According to the NEMA statement, "The United States depends upon its electric systems for the most reliable supply of power possible to run its defense industries and atomic energy installations. This high degree of reliability cannot be achieved by depending upon manufacturers on the other side of the ocean."

New information center for industry

An insulation information center for consultation by industry on insulation characteristics, application techniques, and specifications, has been established by the newly formed National Insulation Manufacturers Association, 441 Lexington Avenue, New York 17, N.Y.

The prime reason for NIMA's formation is to give industrial and commercial users of insulation up-to-date information about all insulating materials. The association committees have access not only to NIMA studies and the research laboratories of their own companies but to data of the American Society for Testing Materials, American Society of Heating, Refrigerating Air Conditioning Engineers, the Building Research Advisory Board and other societies.

The NIMA represents companies who belonged to two organizations now dissolved — Industrial Mineral Insulation Manufacturers Institute and Magnesia-Silica Insulation Manufacturers Association — as well as other members.

Arc welding manual issued by AWS

A new arc welding training manual is available from the American Welding Society. Prepared in response to requests from schools and industry, the manual includes: welding processes and recommended safety practices, metal-arc process, accessories, arc welding equipment, identification of metals and metals and their structure.

Step by step illustrations show how each operation is performed and each exercise details the material, electrode, amperage, voltage, polarity and the purpose of the particular exercise. Book costs $3.00.

AWS Training Manual of Arc Welding may be obtained from American Welding Society, 33 West 39th Street, New York 18, N.Y.

Fuel oil additive solves slag problem

New fuel oil additive solves slag problem in large gas turbine power generators according to two major turbine manufacturers at the Fifth World Petroleum Congress in New York.

The additive is a completely soil-soluble formulation having the unique property of dispersing itself throughout the oil. The additive therefore can be introduced directly into the fuel storage tanks, eliminating blending and proportioning equipment usually required to inject additive materials into the burner fuel line.

The additive is being used successfully for slag prevention in public utility power stations operating on Bunker C fuel oil with an ash content of up to 700 ppm. Heretofore, the high ash content of Bunker C fuel has resulted in a rapid build-up of vanadium pentoxide deposits in the form of slag on the blading of gas turbines. This consequently reduces inefficiency.

Net savings of 11 percent of the fuel cost have been reported as compared with operations on untreated oil of the same grade, based on equivalent power generated.

(Perolin Fuel Oil Treatment is manufactured by The Perolin Company, Inc., 350 Fifth Avenue, New York 1, New York.)

Circle 9626 inside back cover.

Environmental societies plan merger

A merger has been announced between the Institute of Environmental Engineers (IEE) and the Society of Environmental Engineers (SEE) by Roger J. Amorosi, past president of IEE. The association's new title is Institute of Environmental Sciences.

Since the two organizations have similar aims and objectives, it is believed that the merged organization will be

one that will function efficiently for the improvement of the science of environmental engineering.

The IEE which has seven local chapters was formed in April, 1955, as a descendent of the science section of EEI. The SEE was formed in March, 1956, and has a membership of approximately 160 members.

President of the new organization is Harold C. Jones, Westinghouse Air Arm Division, Baltimore, Md. Mr. Henry Sander of Vapor Heating Corporation, Chicago, is executive secretary.

Devices generate power directly from heat

Electric power generated directly from heat by devices that do not require the use of complicated boilers and spinning generators was described at a recent ASME meeting in St. Louis.

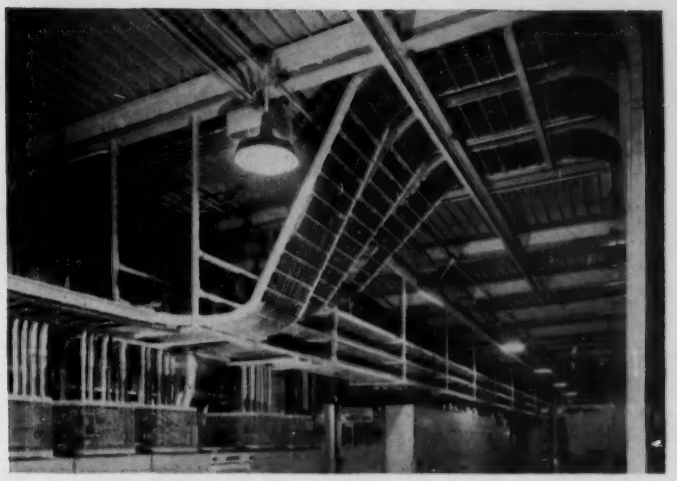
One device, called a fuel cell, would burn conventional fuels to produce a flow of usable current. The other, called a thermionic converter, might use heat from a nuclear reactor or from rays of the sun.

In their simplest form, said V. C. Wilson of the General Electric Research Laboratory, thermionic converters consist of a vacuum tube in which one piece of wire is heated enough to make it give off electrons while another piece, colder, collects the electrons and feeds them to an outside circuit. Thermionic converters might power the radios and instruments of an earth satellite.

Fuel cells have excited wide-spread interest as compact energy sources for everything from automobiles to space ships, and as a future means of generating low-voltage electric power on a large scale, according to Herman A. Liebhafsky and David L. Douglas also of GE.

In a fuel cell, a fuel such as hydrogen, coal or carbon monoxide reacts with oxygen from the air. Instead of heat, this reaction generates electricity directly.

how INLAND STEEL uses GLOBE INTERCHANGEABLE TRAYS to support cables in their Indiana Harbor Plant



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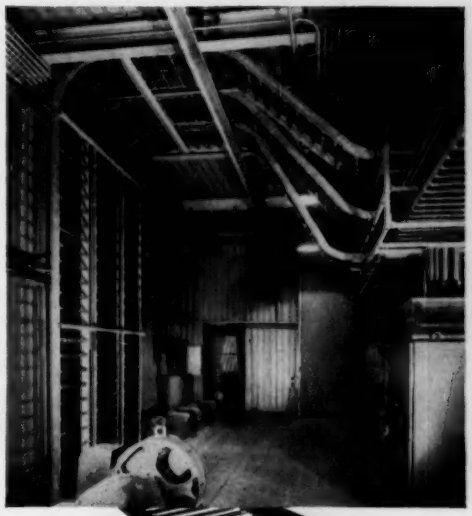
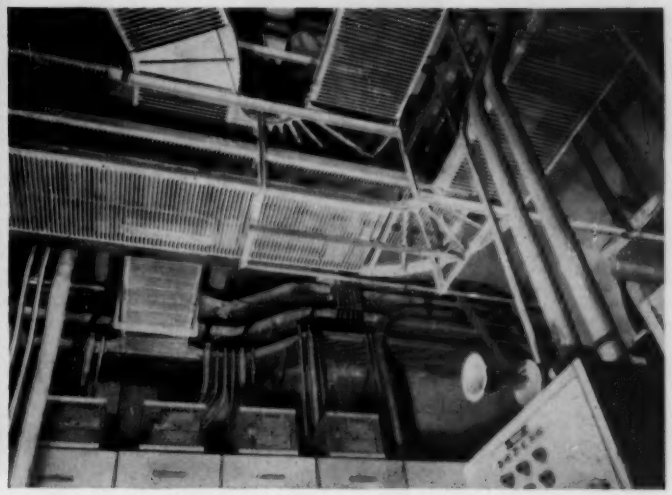
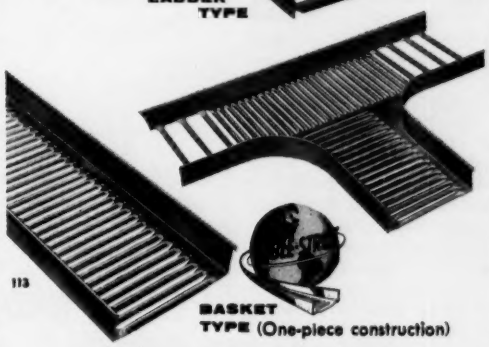
★ No Sharp Edges to Damage Cables





Globetray Pat. Pending

LADDER TYPE



BASKET TYPE (One-piece construction)

Globe's two types of cable trays, one a ladder type and the other a basket type, to support cables, wiring and tubing have become increasingly popular because they can be used INTERCHANGEABLY at any given location depending on the type and weight of the cables to be suspended. The advantages of each type tray can be used to the fullest. Globetray, the ladder type, is intended for use where festooning is not a problem, while Cable-Strut, the basket type, is used for the support of communication wire, instrument tubing and control cables in automation applications.

These two cable trays have been thoroughly field tested in hundreds of large industrial installations, in new plant construction, in power plants and for power distribution in all types of manufacturing processes. Send for FREE catalog giving full information and installation techniques.

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HYDROGEN
in the steam

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Complimentary copies of these bulletins will be sent upon request.

A.S.T.M. BULLETIN D1588-58T

Describes the approved referee method of testing for gaseous hydrogen in industrial water.

CAMBRIDGE Bulletin No. 148 BP

Describes both the CAMBRIDGE Dissolved Oxygen and Dissolved Hydrogen Analyzers.

Instrument shown may be used to record either O_2 or H_2 or both simultaneously. Cambridge also makes Hydrazine Analyzers, PH Recorders and instruments for analyzing gaseous mixtures.

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Circle 9539 inside back cover.

LETTERS

Your views are welcome in this column. Address "Letters, Plant and Power Services Engineer, 111 East Delaware Place, Chicago 11, Ill." Letters should be brief and confined to the editorial of this magazine or other topics of interest to the plant and power services field.

Reprints available

In the June, 1959, issue of PLANT and POWER SERVICES ENGINEER, an article entitled, "Tackling Water Problems in Air Conditioning Plants," by J. L. Thornley of the Bird-Archer Company, appeared on page 13.

We would appreciate it if you could send us a reprint of this article or a copy of the magazine in which it appeared.

RILEY SHUTTLEWORTH
Mechanical Engineer
McGuire & Shook, Compton, Richey and Associates

Aid to the cause

We were very much impressed with Mr. Arthur Stern's article "Air Pollution Legislation," in the August issue of PLANT and POWER SERVICES ENGINEER.

We have been trying to get State-enabling Legislation here in West Virginia, and we feel that by presenting a copy of the article to each of the State Senators and Delegates that we will be able to help our cause.

We are a non-profit organization striving to improve the foul air situation in the Upper Ohio Valley area. This area encompasses two states (Ohio-West Virginia), eleven counties, and contains approximately one and one-half million people.

This same area is now the largest industrial development area in the world.

Unfortunately, Wheeling is the only community that has an Air Pollution Control Ordinance, and we lack the sanction of State-enabling Legislation. Nevertheless, we have made outstanding progress in the reduction and elimination of all types of air pollution problems in Wheeling.

We would certainly appreciate receiving 235 copies of the article to help us in our cause.

JAMES C. MARTIN
Executive Administrator
Ohio Valley Air Pollution Control Council, Inc.

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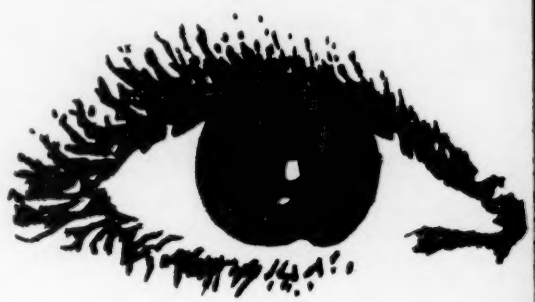
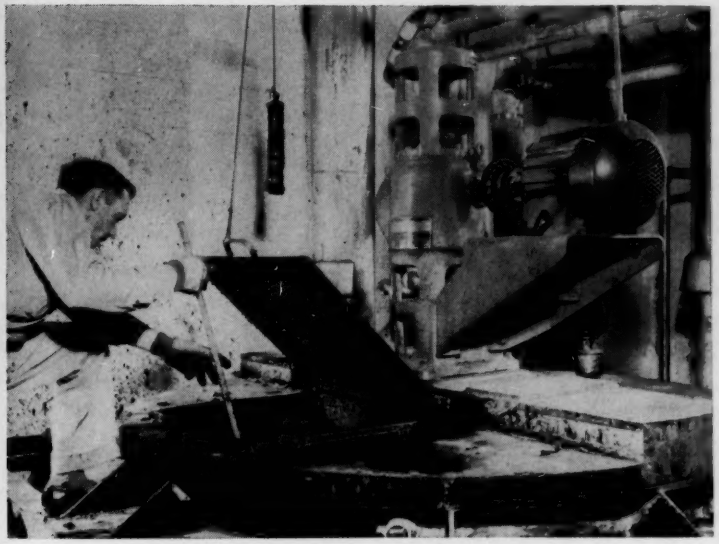


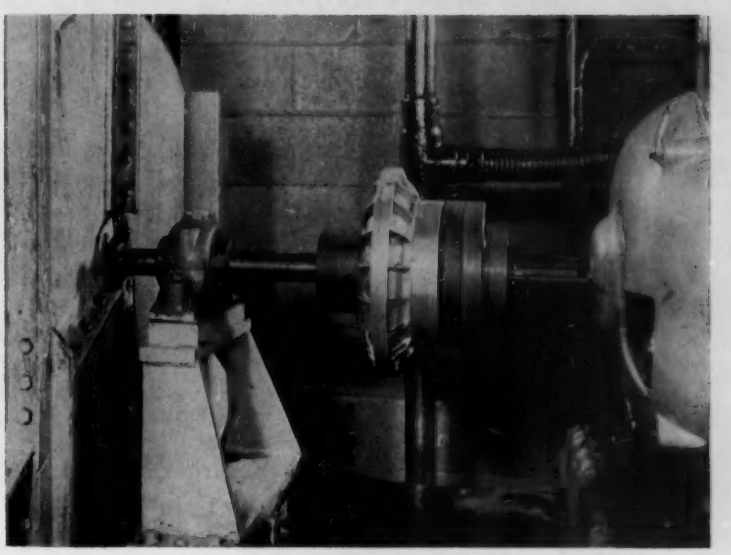
LOOKING FOR SPEED REDUCERS?

Read about the latest development in speed reducers. This story is in the NEW DEVELOPMENTS section which starts on page 34. You'll find descriptions of many other types of plant and power services equipment there, too.

OCTOBER, 1959
VOL. 1 NO. 6
Plant and Power Services Engineer



Because inadequately melted asphalt causes overload on mixer motors, H.P. Smith Paper Co. was experiencing frequent motor burn-outs. By substituting dry fluid couplings for conventional flexible coupling, motor burn-out and downtime for replacements were completely eliminated



Dry fluid coupling is a torque-limiting device that slips for two to four seconds and protects against damaging overloads during start-up

Dry fluid couplings handling frequent overloads on asphalt mixer motors . . .

Stop Motor Burn-out, Eliminate Downtime Losses

H. A. COUNTRYMAN, Editor
with **E. D. BUNYEA,** Plant Engineer
H.P. Smith Paper Company, Chicago, Ill.

"We burned out motors like crazy," was the comment of engineers at H. P. Smith Paper Co., Chicago, when referring to their asphalt mixing operations. Frequent motor overloads would result during start-up because the fluid state of asphalt cannot be accurately determined.

Each of three mixers is loaded with 8000 pounds of asphalt. They are operated alternately for a week, with six starts daily. Asphalt hardens while mixers are idle, then is heated before mixing.

Conventional flexible coupling formerly used did not protect the 5-hp, 1750-rpm motors from overloads. Motor replacements at $130 per motor were frequent.

Downtime of a mixer, if spare motor was in stock, ran about two hours, at a cost of about $100 per hour.

Three and a half years ago, the plant installed dry fluid couplings on all three mixers. Dry fluid coupling is a torque-limiting device that, in this case, slips for two to four seconds and protects against any damaging overloads during start-up.

Torque capacity of the unit is easily adjusted to provide extra-gentle start or, as in this case, high torque starting capacity. In both cases, the motor gets up to near full speed (and thus low amperage) within less than a second.

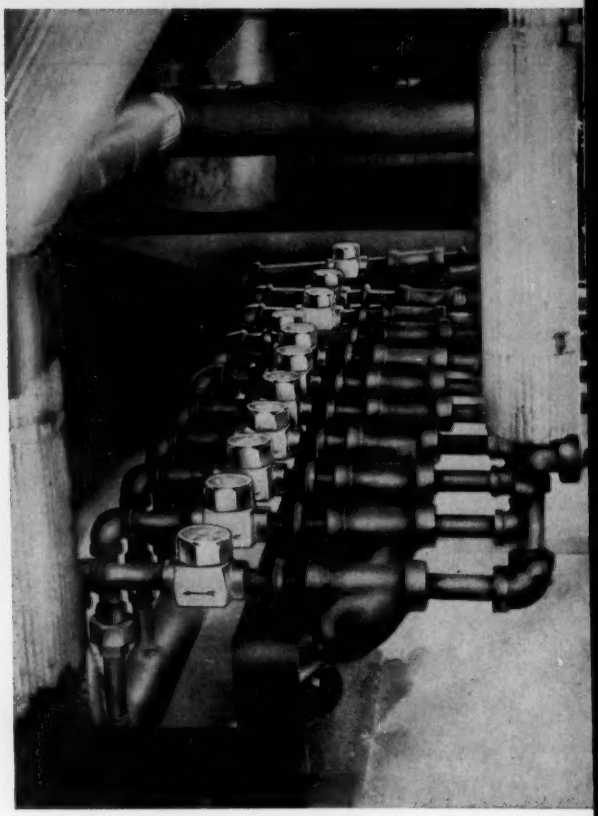
After starting period of slippage, coupling "locks in" and operates entirely without slip at 100 percent efficiency.

Since installing the dry fluid drives, the plant has not had a single motor burn-out, and has had no downtime losses. No maintenance has been needed for the couplings.

(Flexidyne dry fluid drives and couplings are manufactured by Dodge Manufacturing Corporation, Dept. P&PSE, Mishawaka, Ind.)
Circle 9541 inside back cover.

Traps Handle Varying Steam Pressures Without Adjustment

Units are self-adjusting over a range of 10 to 600 psi and serve to drain condensate as fast as it is formed in heating a wide variety of equipment at Armour's McCook plant



Eleven traps on tracer line manifold show how traps' inline construction allow installation in tight quarters

In 1955, the plant engineering staff of the McCook, Ill., plant of Armour Industrial Chemical Company, a division of Armour & Company set up a requirement for a steam trap that would do a top-notch job of venting air and draining condensate as rapidly as it formed, be strong enough to simplify installation, and require little or no maintenance.

Most important requirement, however, was that the trap be suitable for the various steam pressures called for in the numerous services, without adjustment.

These services include, among others, tracer lines, storage tank heaters, high-pressure steam main drips, and process units involved in the production of fatty acids and their derivatives. Many of these products require accurate heating temperatures to keep them from freezing and, at the same time, keep within rigid quality control standards.

Steam pressures throughout the plant range from 15 to 160 psi.

A test installation made that year on a few "Thermo-Dynamic" steam traps showed that the traps:

- discharged condensate as rapidly as it formed, without wasting live steam.
- made installation easy — even in tight quarters — through their compact inline construction.
- required almost no maintenance.
- were self-adjusting through full operating range of 10 to 600 psi. No adjustment was necessary for varying steam pressures.

The operating principle of these "Thermo-Dynamic" traps calls for the velocity of the fluid to operate the valve and the recompression of the flowing fluid to snap the valve closed — and to hold it closed. Air or condensate entering the trap must flow from the inlet tube — radially across the underside of the disc valve — to the outlet.

The space between the inlet tube and the disc forms a nozzle in which the incoming fluid is partly expanded across the underside of the disc, resulting in a decrease in pressure.

As a high-velocity jet of fluid strikes the side of the upper chamber, some recompression takes place, so that the pressure above the disc becomes greater than the pressure below it.

The velocity of condensate is comparatively low, exerting little influence on the disc, which remains clear of the seat allowing free and complete discharge. When steam reaches the trap, the velocity increases sufficiently to overcome the upward force at the inlet tube, and the disc snaps down in the inlet tube, which is the inlet valve seat.

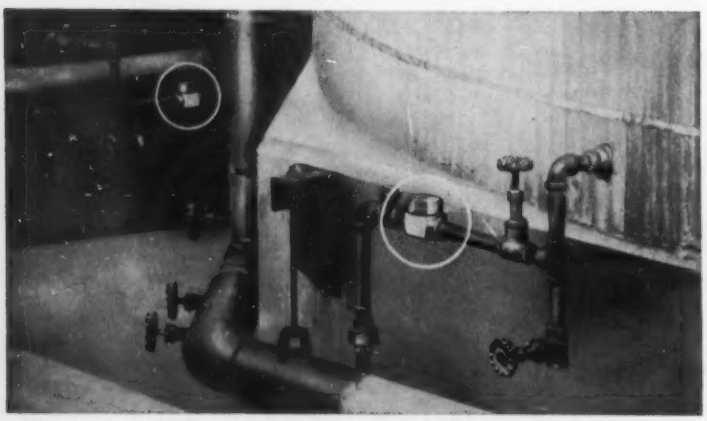
Simultaneously, the disc also seals the outer ring which isolates the space above the disc from the outlet. The disc valve is held firmly against the inlet valve seat until the pressure in the control chamber is reduced by condensation.

The upward force then exceeds the downward force and the disc valve opens, to discharge air and condensate once more.

Based on the results of the test, Armour's McCook plant engineers began to install the traps in 1956 on a wide variety of equipment.

As the plant further expanded, these traps were written into the specifications. By the third quarter of 1958, there were 309 "Thermo-Dynamic" traps in use at the plant.

("Thermo-Dynamic" steam traps, Type TD-50, are manufactured by Sarco Company, Inc., Dept. P&PSE, 635 Madison Ave., New York 22, N.Y.) Circle 9542 inside back cover.



Traps handle varying steam pressures without any adjustment. They also discharge condensate as it forms to assure accurate temperatures in heating equipment

CENTRALIZED LUBRICATION — when, where, how you can profit by it

Costs of new equipment and machinery are at an all-time high — and depreciation allowances are brutally low — in fact, so low that they can't be accumulated in reserves for replacements as fast as equipment wears out.

Yet, you can help bring down the price of machines in your plant by making them profitably productive for years longer with lower maintenance costs and by adding to productive machine hours per day — with the same labor package — by eliminating downtime for lubrication or repairs.

In this article, Mr. Brown tells P&PSE readers how they can take the "modern" approach to lubrication — that of centralized systems.

WILLIAM A. BROWN, JR.
Vice President
Stewart-Warner Corporation
and General Manager
Alemite and Instrument Divisions

Lubrication has been recognized as so essential a factor in keeping machines productive, and plants profitable, that passive reliance on workmen to oil their own machines — or even on so-called "oiling schedules" which still require supervisory follow-up to make sure that they are carried out — is not enough.

Rather, the trend is to eliminate, to the greatest degree possible, the human element in lubrication.

It is paying dividends — and in ever-increasing numbers of plants, in all types of industry!

Opportunity to enjoy the economic advantages of positive, correct lubrication — and thus sustained productivity of machines and plants — is not limited to purchasers of new machine tools or machinery, however.

Virtually every machine — new or old — contains some or all of these basic mechanisms that require lubrication:

Bearings
Slides and Ways
Cams and Rollers
Gears and Chains

What Is "Centralized"

In essence, "Centralized Lubrication" is a method by which a small or large number of bearings on a machine are joined together in a circuit or circuits of piping, tubing or flexible hoses so that each bearing may be lubricated with a *measured* amount of lubricant from a single application point, or source, at specific, preset intervals.

While there can, of course, be many variations in the manner of accomplishing the foregoing, every centralized lubrication system has four basic elements:

1) A reservoir of lubricant
2) A piping system between reservoir and bearings
3) A power source (pump) moving lubricant (grease or oil) through the lines from reservoir to bearings
4) A metering device, controlling the amount each bearing receives.

A fifth element, required when a pre-set automatic lubrication cycle is required, is a timing device to actuate the power source — to send the oil or grease through the system to the bearings before they run hot, and to displace the old worn-out lubricant with fresh protection against friction and failure.

When to Centralize

Almost every machine or mechanical mechanism with multiple points requiring relatively frequent applications of lubricant should be considered for centralized lubrication. If lubrication is to be performed but once or twice a shift, a manually operated system is generally satisfactory. If three or more times per shift, automatic power-operated, timer-controlled systems are generally advisable.

Your experience, in several aspects of plant operations, is your best guide as to when you should convert lubrication practices to centralized methods. Here are some of the conditions to look for — all indicating that it is time to find out what centralized lubrication can do to improve your operations:

- Do you now have to shut down equipment or machines for lubrication? Would elimination of such time losses be profitable to you?
- Do you have a personnel problem — do you find employees incompetent or undependable in lubricating your

To next page

From preceding page

equipment properly, at proper intervals, using the correct lubricant?

- Does manual lubrication — even when supervised and on schedule — still result in product spoilage or contamination, slippery floors or other safety or "housekeeping" troubles?
- Is your bearing replacement bill too high — bearing life too short — as a result of neglected lubrication?
- The foregoing "danger signals," plus many other conditions reflecting lubrication practice shortcomings, have caused a constantly increasing number of plant operators to turn to centralized lubrication — and in so doing they have resolved such problems.

How to Centralize

Getting into centralized lubrication needs not be a perplexing problem. Neither does it involve a major investment, nor disrupt normal operations. Your best bet is to select a manufacturer of lubrication equipment and invite his representative in your locality to call on you.

With this man's counsel — he's been in similar situations before, you'll find — go through your plant and select a piece of equipment for your test. Do not select the one-of-a-kind machine, or that one with only one or two bearings which perhaps have been especially troublesome.

In such an instance, your trouble may not be lubrication, at all, but rather design or misalignment, or the machine may be operating at speeds in excess of its rated speed. It is much wiser to select a machine with a dozen or more bearings, so that results of your test will have genuine significance.

Once your selection is made, again utilize the experience of your supplier. He is prepared to recommend the type of system — oil, oil-mist, grease, spray — and to prepare a bill of materials consisting of the pump, tubing, valves, fittings, etc., needed to install the system.

He can help you check lubricant delivery requirements for each bearing, gear, slide or other lubricated part of the machine, and can provide complete installation and operating instructions. He can advise or supervise your own mechanics in the installation, and "check out" the job when they are finished.

Once the system is in operation on your test machine, give it a complete test. Observe and record such things as lubrication time saved, increased operating time on the machine, increased production, increased bearing life and reduced bearing replacement costs.

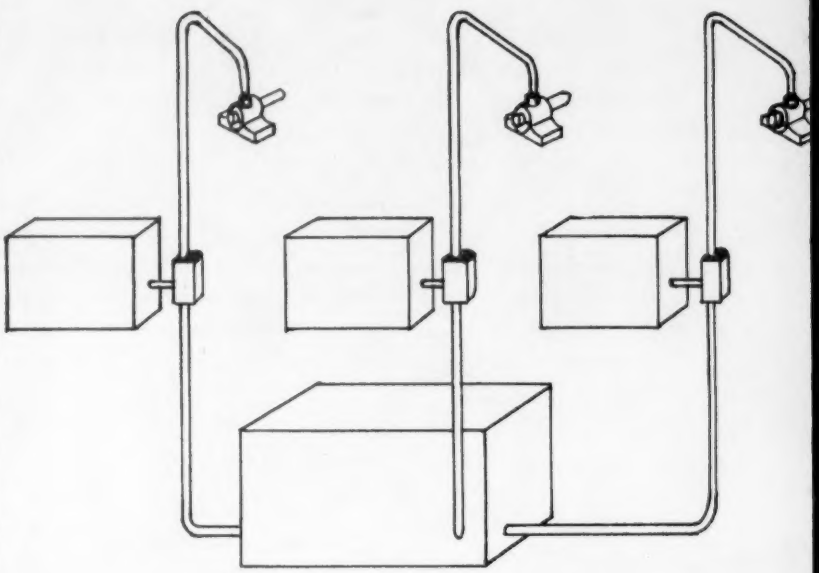
Compare such data with your experience with this same equipment *before* it was centralized — or with a second machine of the same type which you are still operating without centralized lubrication. Your ultimate answer as to what centralized lubrication can do for you — and how far you should carry it throughout your plant — will come from such tests and comparisons.

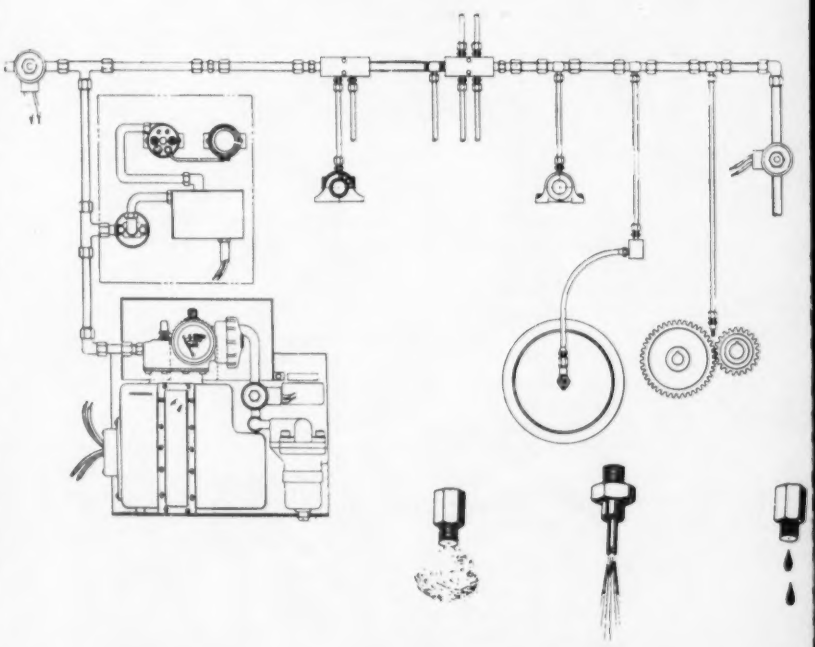
You may wish to conduct, concurrently, tests on different types of machines; or even test more than one type or make of system at the same time, for a direct evaluation of the various systems on the market.

Leading machinery manufacturers, virtually without exception, today offer as standard or optional equipment factory-installed centralized lubrication systems. Many have extended factory approval to specific systems — systems which you may add to a piece of equipment after it is installed and in use in your plant, without nullifying or affecting the manufacturer's warranty.

In considering centralized lubrication for a machine already in use, it often is advisable to check with your lubrication equipment supplier or to inquire of the manufacturer of the machine whether the system you contemplate adding has factory approval. While such approval is vital only when the machine is still within the warranty period, existence of such endorsement will confirm your own judgment concerning the particular system you have selected.

BASIC TYPES OF CENTRALIZED — AND WHERE THEY



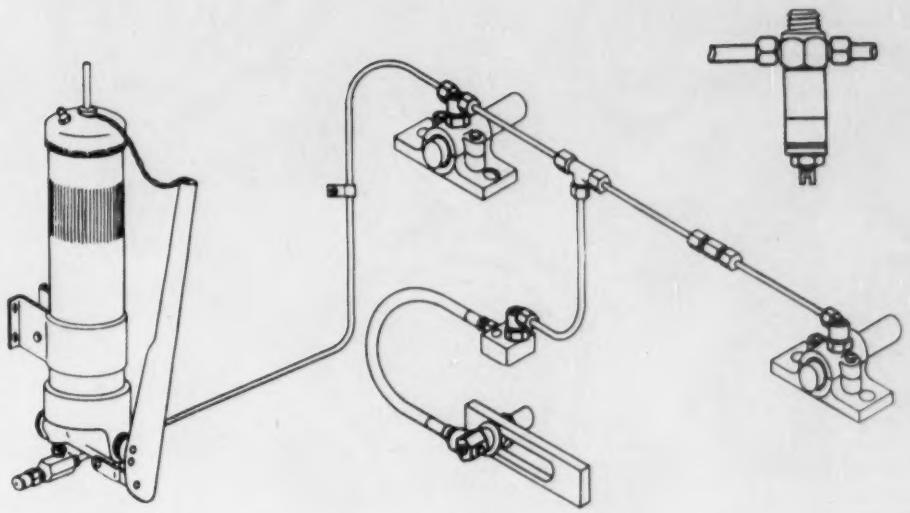


LUBRICATION SYSTEMS CAN BE USED

MEASURING PUMP TYPE for oil only. Uses cam-driven pump for each bearing or lubrication point. Pump has adjustable stroke, draws oil from tubing running to a reservoir, delivers a metered quantity to the bearing it serves.

SINGLE LINE TERMINATING TYPE, for grease or oil. Terminating lubricant line, extending from pump at lubricant reservoir to individual measuring valves at each bearing, is pressurized with either a manual pump or an air- or electrically-operated pump. Each fitting is charged by this lubricant pressure in the line. Pressure indicator shows when adequate pressure (minimum 1250 psi at far end of system) is reached in the line. Lubricant pressure is then relieved, or vented at the system inlet, at which time the individual valves discharge their measured quantity of stored lubricant into their bearings.

If less than 200 lubrication points are served by the system it can be hand-operated; power-operated systems can serve up to 400 valves. Single line is usually adequate where temperatures are not below 50°F.



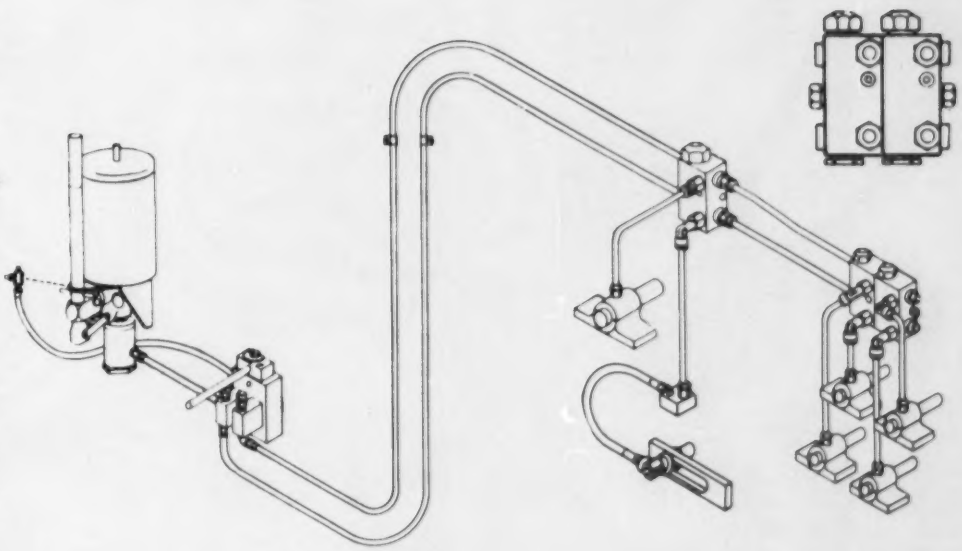
OIL-MIST OR AIRBORNE OIL TYPE. Compressed air enters lubricator through an air regulator, passes through a venturi which draws up and atomizes oil from lubricator reservoir. Oil mist thus formed is conveyed by air pressure through tubing, and enters bearings through individual fittings. Fittings admit oil in mist form, in semi-condensed form as spray, or condensed by the fitting into droplets, depending on needs of individual lubrication point. Anti-friction bearings — ball, roller or needle — most commonly are lubricated with mist; open and enclosed gears, chains, cams, etc., receive spray; and, plain bearings, slides, ways, etc., get droplets. In each type, flow of cool air is delivered to point of lubrication or bearing, minimizing entry of dirt or abrasives from ambient atmosphere.

TWO-LINE TERMINATING TYPE, for grease or oil. Operated hydraulically by applying lubricant pressure alternately through two terminating main supply lines to valves, from one central pumping unit. Direction of lubricant flow is controlled by a "reversing valve," which may be either manual or automatic.

When lubricant is pumped into system through one line, pistons in the valves are hydraulically moved by lubricant pressure, forcing a measured amount of lubricant into half of the bearings. When the lubricant is directed, by the reversing valve, into other supply line, pistons are driven back to original positions, delivering a measured amount of lubricant to remaining half of bearings in system.

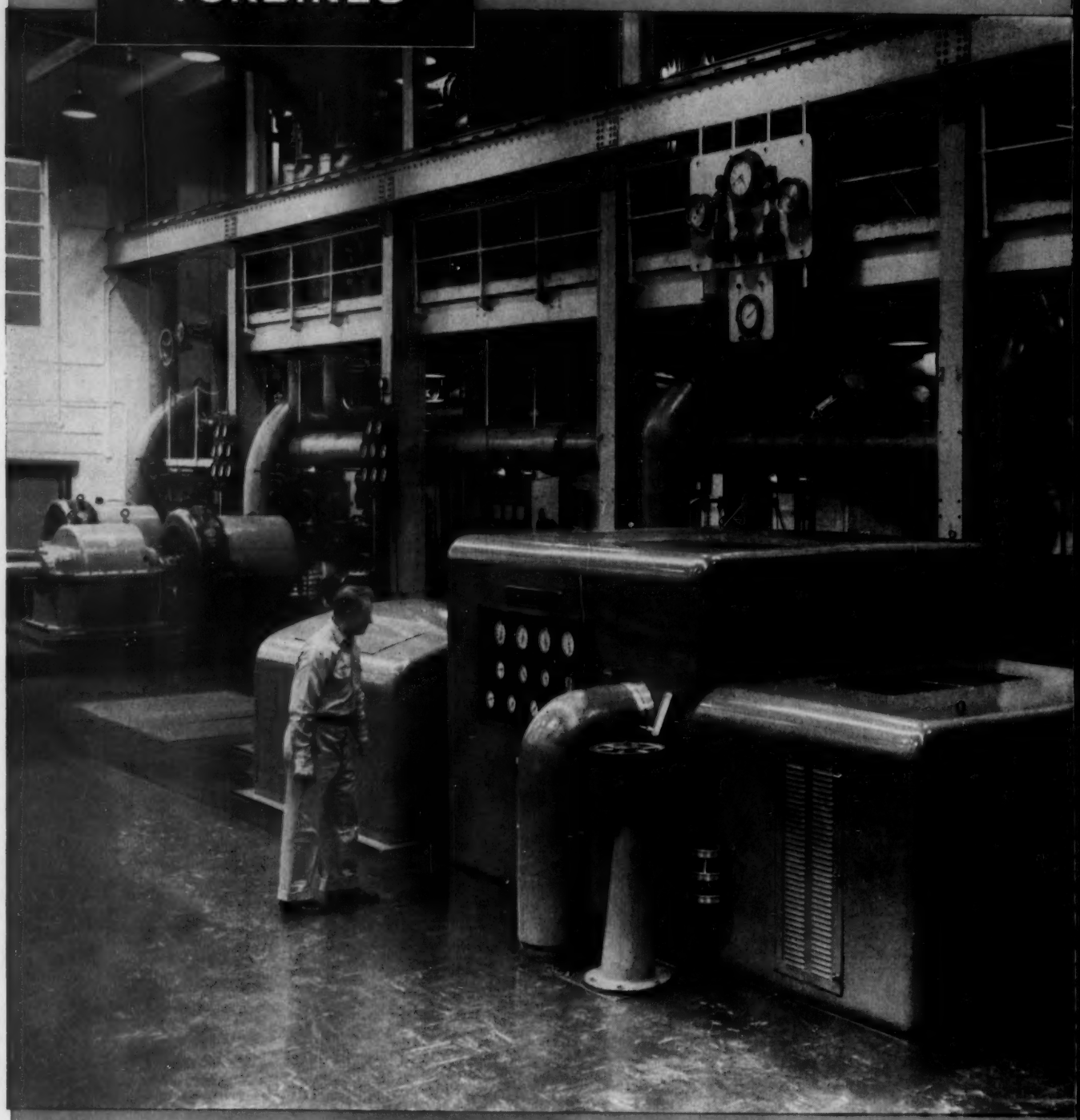
Hand-operated systems of this type can serve up to 200 bearings. Air- or electrically-operated can handle up to 600.

On heavy duty equipment, where the lubricant required is a heavy grade, ambient temperatures are sometimes low, and quantities delivered are high, two line type is usually desirable.



DE LAVAL STEAM TURBINES

for process industries



The photograph above shows a De Laval direct-connected turbine generator installation at Parke, Davis & Co., Detroit, Michigan.

This controlled extraction, controlled back-pressure unit supplies 2000 kw using process steam. Extraction is at 130 psig, exhaust is 5 psig. This new machine was added to already existing De Laval units that have been in service for 30 years. In addition, the Parke-Davis Research Laboratories in Ann Arbor, Michigan will soon be using a new 1000 kw unit.

DL-449

Parke, Davis & Co. uses DE LAVAL Steam Turbines for process and power generation

Proved economy, dependable service

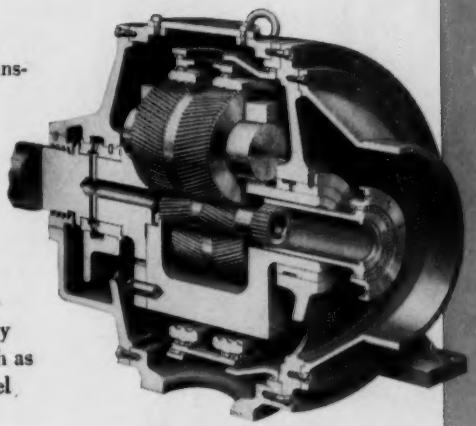
In many process industries, an important by-product is economical electric power. If appreciable quantities of process steam are used, power generation can be achieved at comparatively low cost.

De Laval, pioneer in high speed rotating machinery, has continued to maintain engineering and manufacturing leadership. If you have process application where low-cost power generation can be utilized, call on De Laval.

De Laval-Stoeckicht Planetary Gears

In many applications where high speed and high horsepower are transmitted, the De Laval-Stoeckicht planetary gear can be used to great advantage. It is also used as a speed increaser or decreaser in many industrial installations.

Among its outstanding characteristics are light weight, in-line construction and space saving. It may be used for all kinds of drives such as gas turbines, steam turbines, diesel engines, etc.



Write for Bulletin 2400

DE LAVAL *Steam Turbine Company*

857 NOTTINGHAM WAY, TRENTON 2, N. J.

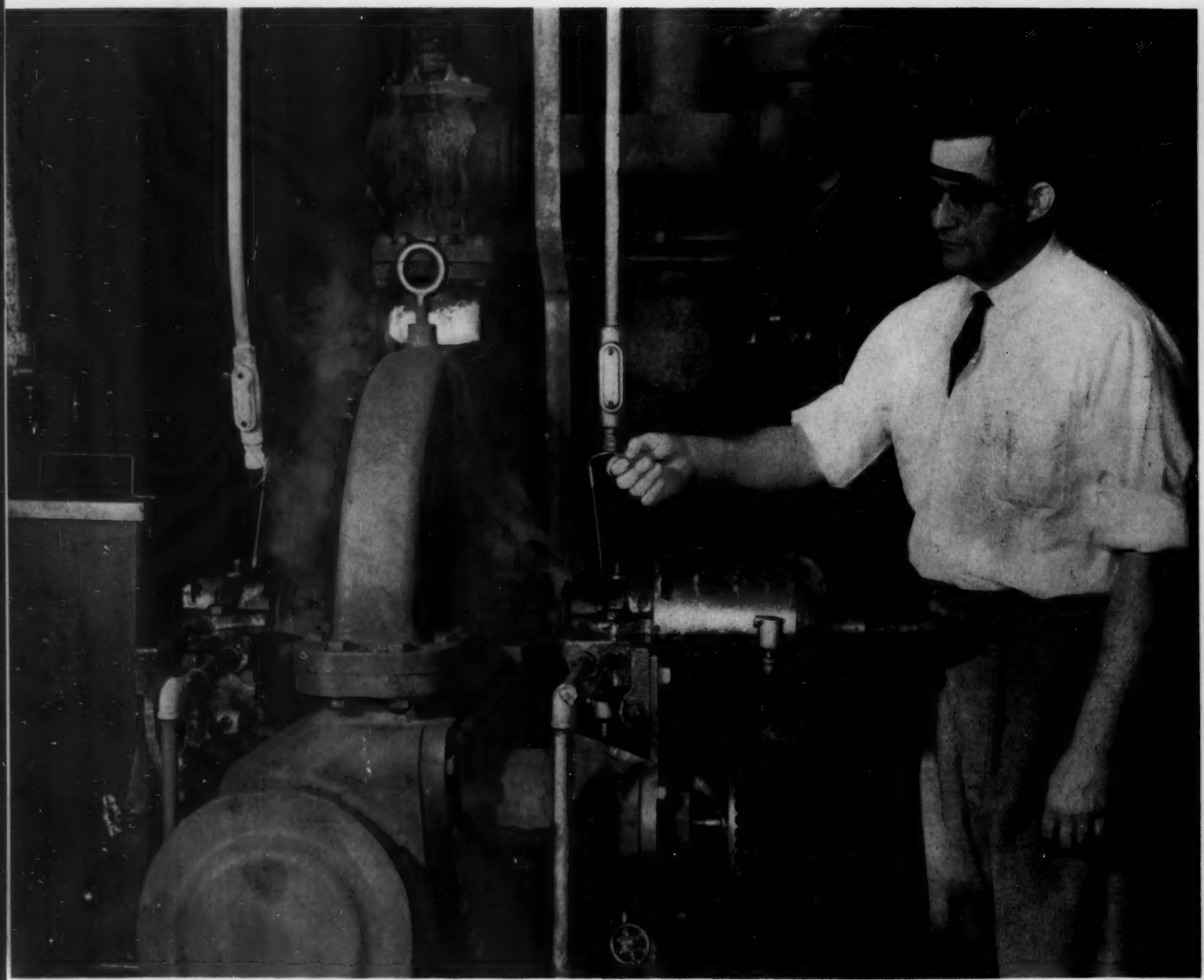
For more information circle 9543 on reader service card opposite covers.

Over-heat protection for power-house bearings via a remote-reading instrument system has reduced cooling-water consumption, increased oil life, and redirected manpower as . . .

Thermistor probes (shown here monitoring two bearings of one river-water pump) are constructed of stainless steel.

Six-inch long probes are used regardless of housing thicknesses. Length of probe does not affect response since thermistor detecting element is located at tip.

Each 3/16" detector is installed by means of compression-type fitting in hole drilled in bearing housing. Mounting hole is drilled to sufficient depth so that tip of probe rests against outer race of ball bearings or babbitt backing of sleeve bearing



Thermistors Monitor Bearing Temperatures to Produce $40,000-a-Year Bonus

A double inadequacy existed in "hand-feeling" system of checking for over-heating of bearings in two power houses and a river-water-pumping station of National Aniline Division of Allied Chemical Corporation in Buffalo, New York.

The faults: 1) Continuous round-the-clock protection was not provided; 2) By the time a three- to five-inch-thick bearing housing became abnormally hot to touch, bearing was generally beyond repair.

Bearings requiring checking are in forced- and induced-draft fans, boiler-feed pumps, and feed-water-transfer pumps associated with five large-capacity steam boilers. Also needing monitoring are bearings in four river-water pumps which handle up to 20 million gpd of cooling water.

An over-heat detection system was set up to replace "hand-feeling" and to provide continuous monitoring of bearing temperatures.

Temperature monitors consist of 84 probes (with thermistor detecting elements in tips). Each is in contact with a single bearing. Each detector is set to actuate visual and audible alarm if temperature of its bearing rises 30°F above normal summer operating temperature (for that particular bearing).

Lead from each probe is connected to amplifier unit which is 40 to 75 ft away. Amplifiers of probes for a given piece of equipment are all connected across single power relay.

Receipt of over-temperature signal from probe by any amplifier in group actuates relay to operate warning light for that unit of equipment. Horn signal, tied in with building's annunciator system, is sounded at same time.

All warning lights are installed on firing floors, which are always manned. Lights for each set of forced- and induced-draft fans are located on control panel of associated boiler. Similarly, warning lights for feed-water and transfer pumps are placed on corresponding control panels.

Annunciator silencing switch is provided on panels for each alarm circuit. System of overhead lights operate in conjunction with warning lights to indicate area of plant where alarm condition exists.

Since thermistor probes are in direct contact with bearings, abnormally high temperatures can be detected before serious trouble develops. Case in point: One detector picked up overload on an induced-draft fan by means of detection of bearing over-heating. At this time bearing trouble had not yet developed.

In addition to providing continuous round-the-clock bearing over-heat protection, system's use has produced three-way cost-savings bonus. Reduction in cooling-water consumption, increased lubricating-oil life, and lessened manpower costs are expected to save company approximately $40,000/year. (System has been in operation for about eight months.)

In setting up detection network, it was necessary to determine actual operating temperature of each bearing. Portable-pyrometer check revealed that many bearings were actually running too cool.

Resulting reduction of water consumption in such instances and elimination of need for general preventive over-cooling previously necessary, have reduced overall cooling-water-consumption rate by roughly 20 percent. It is also anticipated that closer adherence to proper operating temperatures will prolong bearing life.

At higher operating temperatures less condensate is formed in gear-box lubrication systems. This has doubled life of lubricating oil, to provide second savings factor.

(Over-heat detection system was developed by Fenwal Incorporated, Dept. P&PSE, Ashland, Mass.)

Circle 9544 inside back cover.

Two warning lights, above operator's hand on this boiler control panel flash on to indicate abnormally high temperature in a bearing of forced-draft fan (left light) or induced-draft fan (light right). Operator is touching annunciator silencing switches

HOW TO HAVE A TROUBLE-FREE ALUMINUM COOLING

Twenty-five story Continental Can Building where an all aluminum cooling tower has undergone a trouble-free test program for past six years

Six-year test program set up at Continental Can Building sets up proper procedure for design, water treatment and maintenance to insure trouble-free performance where serious corrosion problems were expected in an all-aluminum cooling tower

WHEN a cooling tower was planned for the existing 25-story Continental Can Company Building at 100 East 42nd Street in New York City, the load-bearing limitations of the building dictated the use of an aluminum cooling tower for a 600-ton steam-absorption air conditioning plant.

To install a conventional steel tower would have required extensive reconstruction of the building's upper floor steel work — a job that would have added considerably to the cost of the installation.

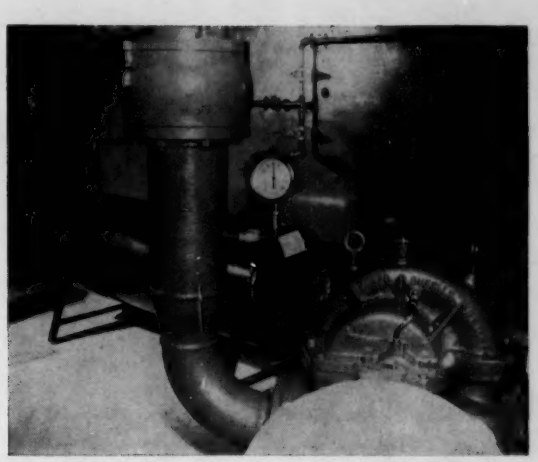
Because it would be operating in an urban location where serious corrosion problems were expected, an unusual program of preventive maintenance was set up to insure trouble-free performance. The program was worked out by Water Services Laboratories, Inc., in cooperation with the operating engineer of the building.

Six years of operating under this program has established a procedure which has given excellent results.

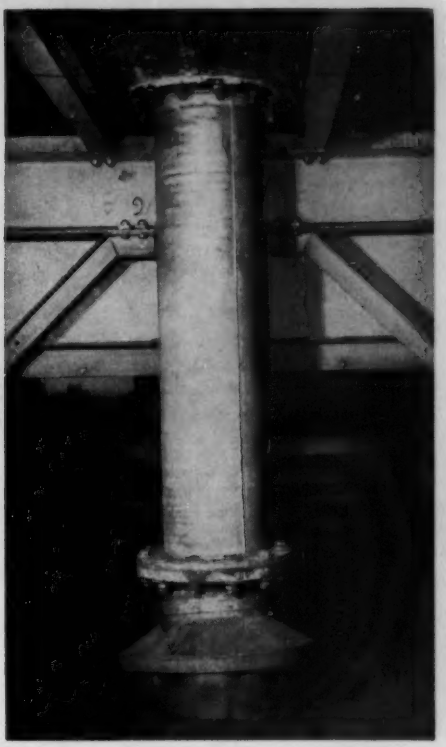
It was decided that all parts of the structure members

TOWER

W. P. THURBER
Chief Engineer
Water Services Laboratories, Inc.
New York, N.Y.
and **PATRICK ROWLAND**
Operating Engineer
Continental Can Co. Building
New York, N.Y.



The importance of water treatment to maintaining a trouble-free aluminum cooling tower cannot be overemphasized. This unit assures introduction of chemical solution in continuing small amounts whenever water is circulated



Anticipating rapid localized corrosion of aluminum piping where it is joined to black wrought-iron piping from absorption units at roof level (bottom), engineers recommended insertion of expendable four-foot aluminum-clad aluminum-alloy flanged sleeve. Such a section could be easily and inexpensively replaced upon failure without disturbing fifty-foot run of supply line to tower

above the roof level were to be aluminum too. No. 1200 alloy aluminum was specified for the 10-inch supply and return piping and the spray header lines.

From information obtained during an earlier field research project, it was known that proper treatment of the condenser cooling water was essential. In addition, the reservoir pan, structural members and inside of tower side walls had to be coated with a hot-mopped, black mastic coating.

The choice of horizontal corrugations for the side walls permitted dirt to settle on these surfaces and made the use of a protective coating necessary. Also, previous experience had shown that, when organic matter is scrubbed from the atmosphere by the spray water, much of it settles to the bottom of the cooling tower pan where there is a minimum of water circulation.

Local corrosion cells are thus set up, resulting in rapid pitting of the aluminum if it is uncoated. As far as the inside of the side walls and the structural members are concerned, these are intermittently exposed to a wet and damp environment and are not continually wetted by the chemically treated water.

This would cause rapid localized corrosion of the 10-inch aluminum piping supply line at the point where it joins to the black wrought-iron piping from the absorption units at roof level. Therefore, the insertion of an expendable four-foot flanged sleeve or spool of No. 1200 aluminum alloy was recommended.

Such a section could be easily and inexpensively replaced upon failure without disturbing the 50-foot run of aluminum supply line to the tower.

The plant was put into operation in the summer of 1953. Within three years, the expendable spool section had developed a number of pinhole leaks, making it necessary to replace this section. During an idle weekend, the replacement was made.

Actually, two replacement spools were fabricated — one for immediate installation, the other for future use. Since No. 1200 aluminum was not readily available at the time, the sleeves were made of No. 50-52 aluminum alloy and clad with pure aluminum to a thickness of 0.008 to 0.010 inches. Ring flanges were brazed to each end of the sleeves.

To minimize bi-metallic attack of the aluminum at the point where it joined the black wrought-iron piping, rubber insulating sleeves, washers and grommets were used when the companion flanges were bolted together at this end of the replaceable spool.

During the replacement operation, it was observed that examination of the black wrought-iron and the 10-inch aluminum piping disclosed no pitting or corrosion of the aluminum, and only vestiges of rust with no pitting could be noticed in the black wrought iron.

Last fall, the replacement spool was again removed for examination. It was found that only the lower 25 percent of the spool (where it joined the wrought iron) showed evidence of shallow pitting. In fact, its over-all condition was so good that it was decided to turn the same sleeve upside down and re-install it for another two years.

In the six years since the plant began operation, the absorbers and condenser units have been opened annually for cleaning and inspection. Except for some normal deposits of air-borne debris in the condensers, the units have been found to be in excellent condition.

The excellent results thus far obtained at this installation can be attributed to diligent preventive maintenance and the five following steps:

1) The importance of proper chemical treatment of the circulating water cannot be overemphasized.

2) Sacrificing the relatively short length of expendable spool to save the 50 feet of 10-inch aluminum piping.

3) Use of protective coating on cast-iron heads, steel tube sheets and selected areas of aluminum tower interior.

4) Annual inspection and cleaning of shell and tube.

5) Fastidious housekeeping of the over-all plant.

NEW SOLUTIONS

for your plant and power services problems

Powder-cutting process cuts through 16-inch thick reinforced concrete at a rate of 6 feet per hour

How to go through concrete without noise and dust

Hospital finds that powder-cutting speeds remodeling job

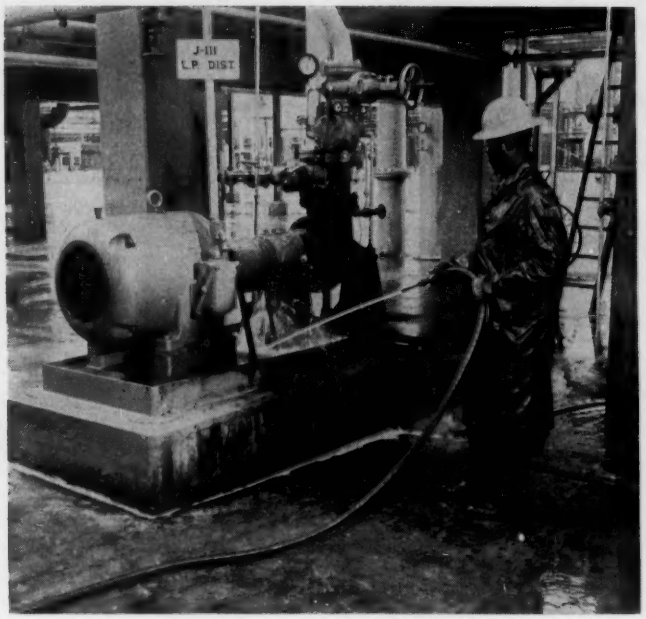
A dramatic flame process is speeding a remodeling project at Huntington Memorial Hospital in Pasadena, Calif., by slicing through reinforced concrete walls 16 inches thick. The process has been found ideal, since it eliminates the noise, vibration and dust that might have endangered patients and critical instruments had conventional methods been used.

The process employs a mixture of iron and aluminum powder which is fed into an intensely hot oxy-acetylene flame. The addition of powder to the 6000°F oxy-acetylene flame creates a reaction that slices quickly, cleanly and accurately through reinforced concrete up to 18 inches thick.

At the hospital, 9 by 5 ft doorways are being cut in the 16-inch thick reinforced concrete at the rate of 6 ft per hour.

(Powder-cutting process is development of Linde Company, Division of Union Carbide Corporation, Dept. P&PSE, Room 2840, 420 Lexington Ave., New York 17, New York.)

Circle 9545 inside back cover.



Unit produces high-velocity jet stream of high-pressure, steam-heated water mixed with detergent to clean centrifugal pumps and other equipment

Aids in plant and equipment cleaning and maintenance

By using hydraulic jet cleaner units, Gulf Oil Corporation has reduced plant housekeeping at its Port Arthur Refinery to a simple and brief routine. With a handy hose, workers can easily use high-pressure hot water mixed with detergent to do a thorough cleaning job of all equipment — such as pumps and condenser tube bundles — and cement floors.

After Gulf bought its first two jet cleaners some years ago, it found them so useful that a total of 14 now are in operation. All are wheel-mounted units which are located at stations with piped connections for water and inlet steam. Some 200 ft of ¾-inch neoprene hose on a stationary wheel permits cleaning within this radius around the cleaner.

Using ordinary plant steam and cold water, the units boost discharge pressure to almost 2-1/3 times greater than the inlet steam pressure. This not only provides the necessary wallop for hydraulic scrubbing action, but also results in a high stream velocity which produces a solid jet even at 30 ft from the nozzle.

Effectiveness of cleaning is increased by the higher temperature of the stream (about 140°F) and by the addition of detergent which is drawn from a 55-gal storage drum in preset proportions through the siphoning action of the unit.

On heat exchanger bundles, the jet cleaning stream ricochets through the tubes, cleaning even the inner tubes and coming out the other side, considerably dispersed, but still with force.

(Hydraulic jet cleaner is manufactured by Sellers Injector Corporation, Dept. P&PSE, 1636 Hamilton St., Philadelphia 30, Pa.)

Circle 9546 inside back cover.

Uses iron cement in furnace improvement to save two weeks and $35,000

Material acts as filler and grout in leveling jobs

By using 2500 lb of iron cement as a filler and grouting material in a blast furnace improvement program, Pittsburgh Steel Company was able to save approximately $35,000, the cost of new castings, and to return the furnace to production two weeks sooner.

When relining of the furnace was undertaken in 1957, it was found that the bracket castings supporting the revolving distributor ring had become badly warped. As a result, a new revolving distributor that was to be installed did not seat properly.

Scallop-type warping on the bracket coatings created voids up to one inch in thickness on the ring coating which measures 6 inches by 54 feet circumference. The void had to be eliminated to prevent furnace gas leaks.

There were two possible solutions: install new top ring support castings, or fill the voids. The latter was obviously the more economical solution.

The filler had to withstand temperatures of 800°F and above, and pressure of 120 inches water gage. It had to perform in such a way that the fill would be absolutely gas tight.

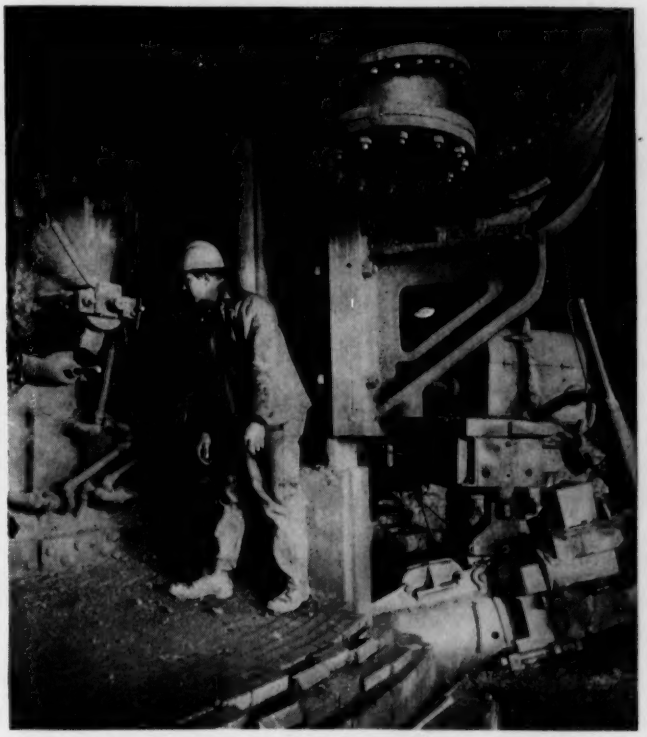
Since the iron cement was used on the job, there has been no indication that it has been anything other than successful.

Another maintenance problem was handled by the same material. This time, the huge base support columns were involved. These columns measure 42 by 60 inches at both the base and top. It was found that, on five of the twelve columns, base and top plates were warped.

Ordinarily, filling the voids and leveling up the columns would have called for a grouting job. In this case, however, the voids were actually too narrow to permit a good grout.

Again, the iron cement was applied between the metal surfaces and found to handle the job successfully.

(Smooth-On No. 2 is manufactured by Smooth-On Manufacturing Company, Dept. P&PSE, Jersey City, N.J.) Circle 9547 inside back cover.



Iron cement material was used without any grouting to seat and level the support column (center) which had become warped at base and top

Quiet, Efficient, Convenient

Ideal for Hospitals, Hotels, Apartments, and Industries where noise is objectionable

Rotojet Electric Tube Cleaner thoroughly cleans straight tubes from 25/32" to 4" I.D. in boilers, condensers, evaporators, and heat exchangers so quietly that it can be operated without disturbing anyone.

This self-contained unit comprises a powerful motor, rotatably mounted on a stand, a required length of heavy duty flexible shaft, a 20 ft. cable, and a selection of heads, brushes, drills, and scrapers to meet any cleaning need. The motor swivels and rotates so that tubes on top, bottom, and sides can be cleaned without moving the unit. A few of the many types of heads available are shown below.

Bulletin 107 gives full details of this quiet, efficient, convenient tube cleaner. Send for it now.

Expanding wire brush.

4-way drill and universal coupling.

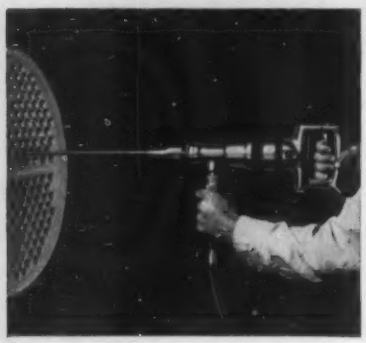
Rotojet Electric Tube Cleaner with swing-frame head.

ELLIOTT COMPANY
ROTO PLANT
Tube Cleaner Specialists Since 1910

151 Sussex Avenue, Newark, N. J.

Circle 9548 inside back cover.

AIRETOOL CLEANER



cleans condenser, H. E. tubes fast

This new, advanced design Airetool Model CC-475 Cleaner does a fast, thorough job of cleaning heat exchanger and condenser tubes. Built-in flushing system washes out debris, stops jamming. The result is faster, more complete cleaning. And the flushing agent keeps the cleaning head cool, which extends head life.

You get all these advantages, yet this sturdy, pneumatic tool weighs only 10 pounds. One man operates it easily without need for supporting rig. For full details, or plant demonstration, write today.

USES ALL TYPES OF HEADS

Every type of cleaning head can be used with Airetool Model CC-475. And Airetool makes them all.

BRANCH OFFICES:
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REPRESENTATIVES
In principal cities of U.S.A., Canada, Mexico, South America, England, Europe, Puerto Rico, Italy, Japan, Hawaii.

EUROPEAN PLANT: Vlaardingen, The Netherlands

CANADIAN PLANT: Brantford, Ontario

Circle 9549 inside back cover.

Insulates underground piping, is not affected by moisture

Cellular glass insulation guards five miles of piping at Tulane

When a school-wide air conditioning system was designed for Tulane University campus at New Orleans, a central system which will connect the buildings with piping was chosen in preference to individual units for each building.

For esthetic reasons, it was decided that the piping should be underground, out of sight.

However, in addition to the usual underground piping problems, Tulane's were even more acute since the water table is often only a few inches from the surface. In fact, the pipe had to be anchored in place at some spots to prevent moisture from floating the lines right up out of the ground during construction.

An insulation was needed that not only would be impervious to moisture, but would have the rigidity and strength needed to support the overburden of two to seven feet of earth — and also be unaffected by soil chemicals.

A cellular glass insulation was chosen for the job. Composed of countless sealed glass cells, the material is impervious to vapor and will not pick up moisture. It has an average ultimate compressive strength of over 7 tons per square foot.

The five miles of chilled water lines vary in size from 2″ ID to 16″ OD. All pipes are standard-weight steel wrapped pipes, coated with three alternating layers on 1/16-inch enamel and glass cloth. The insulation was applied directly over this coated pipe.

Insulation thickness is two inches on all piping. Expansion loops are covered with oversize insulation, leaving a two-inch air space between the piping to allow for expansion or contraction.

The pipe was fastened to concrete anchors. The anchors had channel iron embedded in them, and the pipe was welded to this. The entire assembly was then surrounded by the glass insulation to prevent sweating and heat loss.

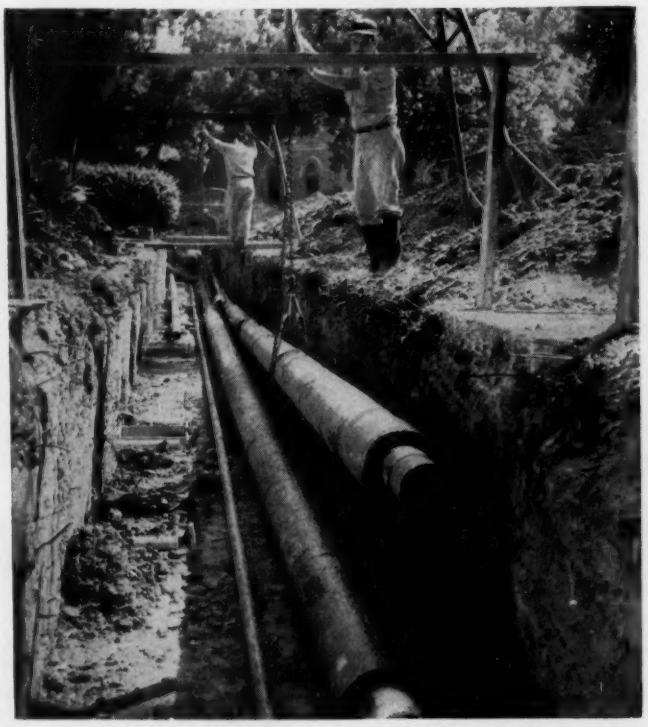
Most of the insulation was installed on the pipe above ground with a mastic material. The insulation was then covered with two layers of glass-fiber mesh embedded in mastic. Three-inch flaps were left free to permit final sealing.

Twelve inches on each end of the pipe were left uncovered to allow welding in the trench. After welding, the bare pipe was wrapped with "Tapecoat." The welded joints were then insulated, and the flaps of the outer covering sealed.

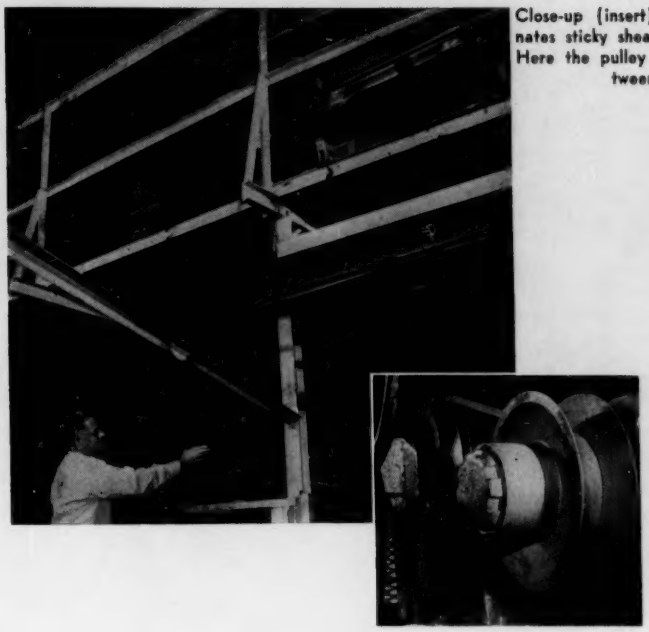
The insulation was fabricated to size from flat block by the insulation contractor. Approximately thirty cars of the insulation were used on the entire project.

(Foamglas insulation is product of Pittsburgh Corning Corporation, Dept. P&PSE, One Gateway Center, Pittsburgh 22, Pa.)

Circle 9550 inside back cover.



Two-inch thick cellular glass insulation is not affected by moisture even in places where the water table is only a few inches below ground surface



Close-up (insert) of variable-speed pulley which eliminates sticky sheave problem at Mercury assembly plant. Here the pulley is used to drive the conveyor link between body shop and paint shop

Overcomes sticking sheaves problem; gets accurate timing of conveyors

Self-lubricating variable-speed pulleys keep Mercury cars moving

Precise speed of conveyors is highly important to auto assembly. At the Mercury assembly plant, Wayne, Mich., the conveyor lines are set to hold speeds regulated to hundredths of minutes. Many variable-speed sheaves are employed to assist in the accurate timing of the conveyors.

However, many of these sheaves would stick when it came time to reset them. Generally the speed of each conveyor section is kept at the set speed until production schedules are increased or decreased. As this is not a frequent occurrence, the sections may go as long as six to eight months without change in the settings of the variable-speed sheaves.

When it came time to reset them, the problem of dealing with frozen sheaves was annoying and expensive.

A sample, self-lubricating, variable-speed pulley was installed for a test run. The experimental drive was set at the desired speed and left untouched for six months. At the end of that period it was tested — and found that the speed could be shifted without sticking.

Furthermore, the oil reservoir was still nearly full.

Another six months went by without further attention. At the end of that time, a second inspection was made. Again, no sticking, but this time 600 weight oil was added.

Mercury now has 21 of these drives installed. They are used on subassembly conveyors feeding the main line.

Lubrication periods are scheduled at intervals of from eight months to a year, depending upon the particular service. No other maintenance is required than to keep the oil reservoirs at the proper level.

On all these drives, the freezing problem has been eliminated.

The pulleys incorporate a new design: A series of nylon-faced rubber keys transmit power from a stationary to a movable flange through the sleeve cap. The keys are located outside the bearing surfaces and do not impede the oil flow from an oil reservoir.

Bearing surfaces are re-oiled with each rotation of the pulley. The continuous rotational pumping action constantly renews and evenly distributes the oil film on the bearing surfaces.

The use of oil prevents fretting corrosion and avoids the possibility of sticking which might come from grease drying and leaving a solid residue. O-ring oil seals retain the lubricant for long periods between refills.

The torsionally resilient keys not only carry the belt torque but assure even distribution of the load and equal transmission of power by both flanges.

Various drive motors are used with the pulleys — from 1 to 7½ hp, 875 to 1750 rpm.

Some of the lines require at least 250 starts and stops per shift — and the drives take this in stride.

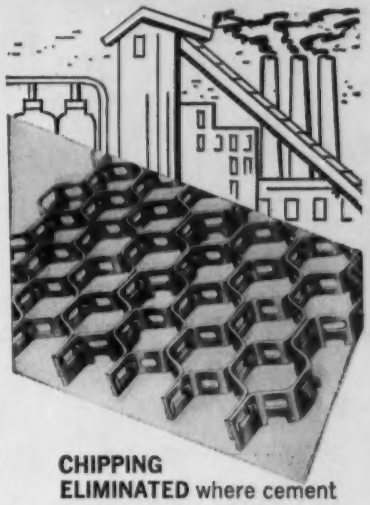
(Self-lubricating MS drives are manufactured by T. B. Wood's Sons Company, Dept. P&PSE, Chambersburg, Pa.) Circle 9551 inside back cover.

GRIDSTEEL®

GREATLY REDUCES MAINTENANCE of cement linings in

★ **INDUCED DRAFT FANS**

★ **FLY ASH HOPPERS**



CHIPPING ELIMINATED where cement surfaces are subject to vibration, erosion, temperature changes, and abrasion.

STRESS RELIEVED CEMENT is obtained by the pre-cracking effect of using GRIDSTEEL hexagonal mesh ¾" or 1" deep. Gridsteel transfers the stress to the outside of the hexagonal cells.

ECONOMICAL thru low cost and ease of installation.

GRIDSTEEL is available from stock.

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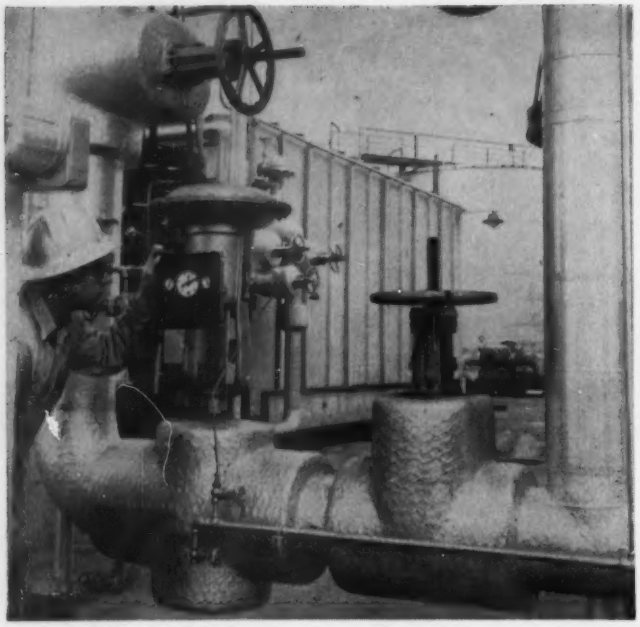
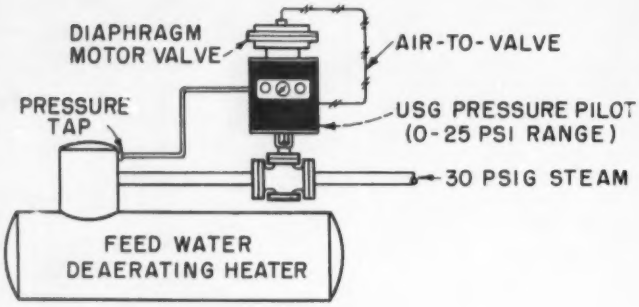


Photo and schematic drawing of valve-mounted instrument for controlling steam pressure in a feedwater deaerating heater. Other such devices are giving low-cost, on-the-spot steam pressure reduction, and pressure and temperature control of fuel oil



Gives on-the-spot pressure, temperature readings, control

At six field locations in Cities Service's new asphalt refinery in Linden, N.J., valve-mounted instruments are providing local, low-cost indication of temperature or pressure together with pneumatic proportional control. Supplementing other extensive instrumentation with indications and records in a centralized control room, the units perform such workaday functions as regulating steam pressures to feedwater deaerating heaters, steam pressure reduction, pressure control for a fuel oil recirculating pump, and temperature of fuel oil from a heater.

Except for routine maintenance, these control systems have given continuous, trouble-free service since July 1958.

They mount on the yokes of the pneumatic-operated diaphragm motor valves that they position to provide automatic control. Five have Bourdon tube elements for pressure control, and one has a filled thermal system for temperature control.

Both the actual value of the process variable and the control set-point are indicated by pointers on the 3½-inch center dial of the controller.

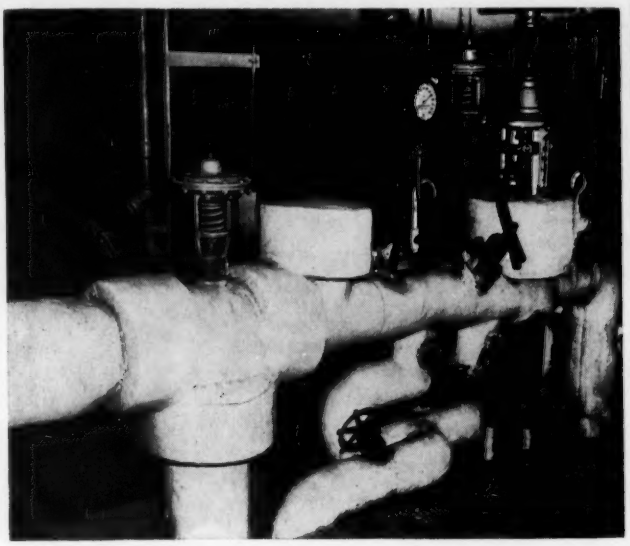
Each arrangement is a closed-loop system, maintaining secondary variables at desired values to aid operators in achieving the best over-all operation.

In operation, the measuring element connects to the Bourdon tube in the valve-mounted controller; the pneumatic signal from the controller connects to the diaphragm motor of the valve to position the valve.

Controllers are equipped with wide-band proportional control with automatic reset to assure close regulation of the variable in spite of load changes.

(Valve-mounted instruments are products of U.S. Gauge, Division of American Machine and Metals, Inc., Dept. P&PSE, Sellersville, Pennsylvania.)

Circle 9553 inside back cover.



Low pressure steam from cooling . . .

. . . high-pressure, high-temperature steam with water is produced in this pressure reducing desuperheater unit at Long Island Lighting Co. to handle plant services requirements at its Edward F. Barrett Station.

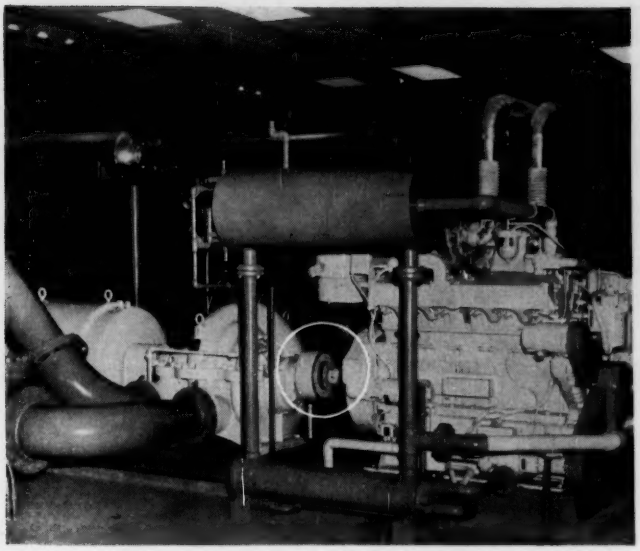
Supplied with steam from the main boilers at 1800 psig and 1005°F, the carburetor-type desuperheater adequately handles the station's low-pressure steam requirements which vary from 500 to 17,000 lb per hr.

The unit reduces the pressure from 1800 to 165 psig, and the temperature from 1005° to 385-400°F, each in one step, and holds these final conditions under rapid load conditions. Maximum flow is 25,000 lb per hr.

The steam is used to heat the station and to feed the combustion-air preheater coils when the station generating unit load falls below a predetermined minimum.

(Pressure reducing-desuperheater was designed by Copes-Vulcan Division, Blaw-Knox Company, Dept. P&PSE, Erie 4, Pa.)

Circle 9554 inside back cover.



Automatic centrifugal clutch coupling (in circle) assures smooth starting of diesel engine in stand-by pumping service

Gives no-load starting and load-free idling to safeguard water pumping

If normal power source should fail at the Department of Water and Power, City of Los Angeles, Coldwater Canyon pumping plant, a VT-12-1 Cummins industrial diesel engine, rated 400 hp at 1775 rpm, automatically begins driving a De Laval two-stage, 2500 gpm, horizontal pump through an automatic centrifugal clutch.

The clutch utilizes metallic friction shoes to achieve high performance and longer life. It gives full overload protection, drive in either direction, and can safely operate at higher temperatures. It provides no-load starting and load-free idling of the engine.

The clutch is entirely mechanical in operation.

The Los Angeles pump operation uses a clutch with delayed engagement and of the direct drive type for in-line, shaft-to-shaft connection.

"Delayed engagement" means that spring tension holds the shoes out of engagement with the driven half of the clutch until the driving half reaches a pre-determined rpm.

Above this rpm, centrifugal force acting on the shoes overcomes the spring tension and smooth starting of the driven equipment is assured. Since the shoes do not contact the driven half of the clutch until a pre-determined rpm is reached, the delayed engagement is ideal for dual or stand-by drives.

The cushioned start obtained with the clutch means there is no sudden load imposed on the engine, minimum stress on the clutch, and no shock to driven equipment. Jamming or overloading of driven equipment causes the clutch to slip, thereby protecting the engine against excessive overload.

(Rawson clutch couplings are products of The Formsprag Company, Dept. P&PSE, 23601 Hoover Rd., Warren (Detroit), Mich.)

Circle 9555 inside back cover.

POWER PLANT & POWER SERVICES INDUSTRY . . . has grown into

Plant and Power Services Engineer

LAST YEAR, we placed the words "Plant and Power Services" inside our magazine's name to tell you, our readers, that this magazine devotes its editorial efforts solely and completely to serving you key engineers responsible for these activities. . .

. . . whether you're in one of the many industries — no matter what or how many products your company makes — in utilities, in large public and private institutions, schools, hospitals, etc., or in a consulting capacity alone.

As an engineer responsible for these plant and power services, your scope of operation is not bound or limited by any one industry. The products and services needed to create and maintain the environment and provide the facilities necessary for effective operation of your particular industry are identical with — or closely related to — the products and services needed to run your neighbor's plant . . . or that plant on the other side of town . . . or that big utility nearby.

And . . .

. . . as you know, there is no logical separation of "plant services" and "power services." The responsibility of managing both come under your or your staff's single direction.

Because this magazine is for you, we have taken a major step toward identifying it with your job. That is why this magazine has grown into PLANT and POWER SERVICES ENGINEER!

— The Editors

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NEW DEVELOPMENTS

for

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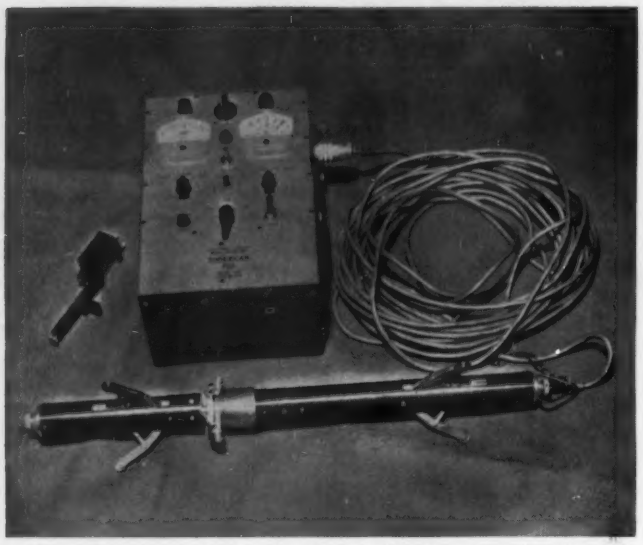


Instrument measures depth and profile of defect on internal surface of tubing or piping

Tells location and measures amount of corrosion in pipe and tubing

Providing a complete and accurate inspection of the internal surface condition of tubing and piping, instrument will permit the determination of pitting, bulging, corrosion and scale build-up. It will measure tube diameters from 2" to 10".

The instrument is easy to operate. Prior to placing the probe in the tube or pipe, the wheels and sensing element are dialed in for desired pipe sizes. No further adjustment is required.

While scanning, it will detect a defect and locate its position relative to the working end of the tube in "feet." As the probe is drawn through the tube, at a moderate rate, the spiral pattern advances about 1/16" per revolution, thereby covering the entire internal surface.

When a defect is located, the instrument is set on a special measuring circuit which measures the defect between 0 and 0.3 inches deep, to an accuracy of 0.01 inch.

The self-contained power supply, furnishing 6v DC, should never need replacing. No external plugs or cords are required.

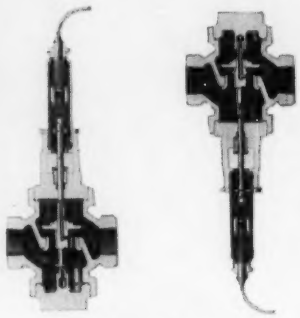
The instrument is easily adapted for purging, with inert gases. Purging allows non-explosive atmosphere to blanket electrical components.

(Tubescan 105 is product of Union Industrial Equipment Corp., Dept. P&PSE, 40 Beech St., Port Chester, N.Y.)
Circle 9556 inside back cover.

Temperature regulator handles heating, cooling services

Designed for applications such as instantaneous heaters and coolers, shell and tube or shell and coil heat exchangers, process heating and cooling, as well as space heaters and air conditioning systems, temperature regulators are manufactured in ¾" and 1" body sizes in both cast iron and bronze with screwed ends.

The model designed for heating is a direct-acting device, while the reverse-acting model handles cooling.



Temperature regulator arranged for heating (left) and cooling (right)

Both models are self-contained and self-operated. Design includes a balancing bellows which permits smooth functioning at inlet pressures and pressure drops up to 100 psi.

Other features include a self-aligning, single-seated, tight-closing main valve which is guided throughout its entire stroke.

Variations in temperature are sensed by a liquid-filled thermo-element which is fully interchangeable to eliminate any vapor-filling maintenance requirements.

Volumetric expansion or contraction of the fluid is translated into uniform motion of the valve stem with a precise degree of accuracy and sensitivity. Adjustment for any set temperature is accomplished by hand-turning a knurled adjusting sleeve which may be equipped with a calibrated dial.

A large variety of thermo-elements with various ranges, spans and bulb materials are available. Elements can all be interchanged in the field quickly without the need for special tools or training.

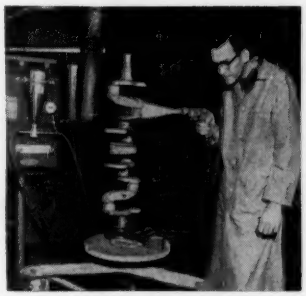
Further versatility is provided by the feature of being able to reverse the valve action by interchanging the bottom cap and bonnet assembly.

(Class M and MR temperature regulators are products of Leslie Co., Dept. P&PSE, 222 Delafield Ave., Lyndhurst, New Jersey.)
Circle 9557 inside back cover.

To rebuild crankshaft spray on metal for added life

An easy-to-apply, long-wearing metal spray powder has been specifically designed for rebuilding worn engine and compressor crankshafts. The material is high in chromium and nickel and contains wear-resistant chromium borides.

Special unit will spray the material. Finish grinding of the sprayed journal completes the procedure. The resulting tough metal spray overlay produces longer crankshaft life.



Metal spray powder will add life to worn crankshafts

A low coefficient of friction is another feature of the powder. In addition, it also possesses, as applied, good oil retention qualities.

("Colmonoy C-290" is product of Wall Colmonoy Corporation, Dept. P&PSE, 19345 John R Street, Detroit 3, Micigan.)
Circle 9558 inside back cover.

This 15kv, 400-amp automatic transfer switch comprises two fuse compartments each containing one 3-phase set of fuses

Outdoor automatic transfer switch features many safeguards

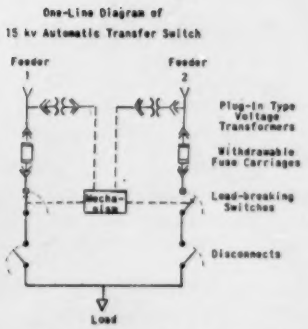
Unit is rated 15 kv

DESIGNED to insure uninterrupted service to power users, 15kv automatic transfer switch of the outdoor type was wide application in industrial plants, hospitals, hotels and large office buildings.

The foreign-made unit features several advantages: Its design permits complete isolation of one feeder switch for inspection or maintenance while its companion feeder switch remains in service. The load-breaking transfer switches as well as the load are protected by fuses so that the main cable remains in service regardless of whether there is a fault in the unit or the protected transformer.

Its plug-in voltage transformers can be easily removed for cable testing or for changing the emergency feeder to the preferred feeder or vice versa.

The unit is completely interlocked for safety in service, maintenance or inspection.



Schematic drawing showing feeder, fuse and transformer connections

Blown fuses can be replaced without the slightest danger to the operator. Shutters cover all live parts when the fuse carriage is in the fuse replacement position.

The current-limiting fuses have an interrupting capacity of 400 mva at 13.8 kv. They have indicator pins which protrude when blown.

The epoxy-resin-insulated potential transformers are arranged ahead of the fuses. Thus, a blown fuse does not interrupt the supply to the potential transformers, and a fault will not operate the switch which would cause the blowing of fuses in the other feeder compartment.

Overall measurements are 50″ wide, 75″ deep and 82″ high.

A typical installation in this country uses one of these switches on two incoming three-phase feeder lines to a high pressure fire pumping station. Should an outage occur on the preferred feeders, service to the pumping station will not be interrupted since the unit automatically switches to the unencumbered feeder line.

As soon as the voltage reappears in the preferred feeder, the unit automatically transfers the load back to the preferred feeder.

(More information on South Wales automatic transfer switch may be obtained from Electro-Machinery Corporation, Dept. P&PSE, 50 Broad St., New York 4, N.Y.)
Circle 9559 inside back cover.

HOLDING POWER
Where You Need It!
With WILCOX Self-Sealing GASKETS

When the pressure is on and you need dependable holding power in your lines, you can rely on Wilcox Self-Sealing Gaskets. Over the years, they have proved their outstanding performance. The U-shaped metal outer cover is packed with a resilient filling, usually rubber or asbestos. Pressure exerted on this filling forces it into the cover, putting force against adjacent flange surfaces. Thus, pressures that tend to blow ordinary gaskets make the Wilcox tighter.

Available with covers of copper, lead, tin, aluminum, monel, stainless steel, etc. in all sizes, standard or special.

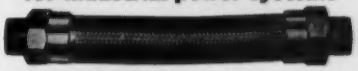
Write for Bulletin No. 569 and prices.

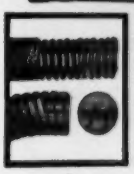
CHICAGO-WILCOX MFG. CO.
7725 South Avalon Avenue
Chicago 19, Illinois

Circle 9560 inside back cover.

COBRA® FLEXIBLE
SEAMLESS METAL HOSE

Custom constructed assemblies for industrial power systems





All sizes in bronze, stainless or carbon steel, monel, inconel and low carbon nickel. Seamless spiral or parallel corrugation... Braided. All type of fittings and flanges welded, brazed or soldered. Also, interlocked hose.

write — wire — phone: RE 7-3311
...for prices and catalogs

COBRA METAL HOSE
5039 S. Kedzie Ave. • Chicago 32, Ill.

Circle 9561 inside back cover.

Variable transformers feature fine adjustment

Employing a different design concept, line of variable transformers features high current ratings and performance characteristics not possible with other types of units. Re-entry rings and helical coils permit continuously adjustable control of 1600 increments over the range of zero to maximum output voltage.

Settings can be made with very fine adjustment because resolution is better than 1/10 of 1% of the input voltage.

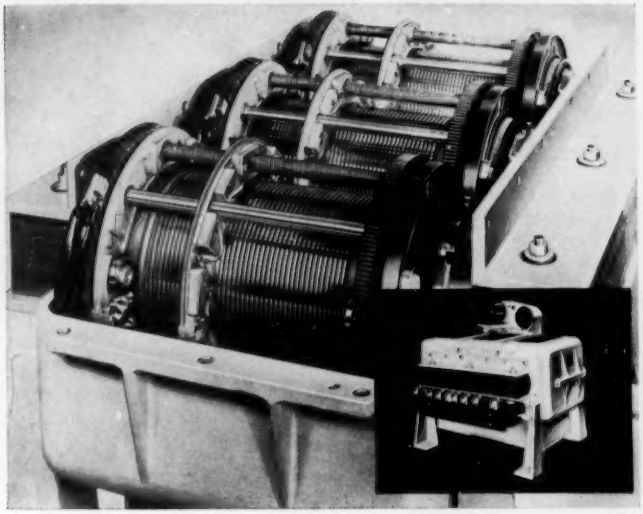
The motor-driven brushes are always in contact with only one turn of the helically wound coil. Because of this, low resistance brushes are used, resulting in low voltage drop.

Two types are available. Both are remotely operated from a control unit mounted either on the unit frame or at any other convenient location.

With an input of 240 v, 60 cycles, 3-phase the convection-cooled unit has an output rating of 0 to 270 v, 200 amps, 93.5 kva. The forced air-cooled unit — under the same conditions — has an output rating of 0-270 v, 360 amps, 168 kva.

(H-C Series Powerstat is manufactured by The Superior Electric Company, Dept. P&PSE, 83 Laurel St., Bristol, Conn.)

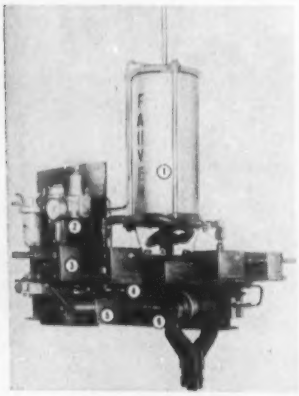
Circle 9562 inside back cover.



Resolution is better than 1/10 of 1%

Automatic lubricator for conveyors uses both oil, grease

Handling either oil or grease, automatic conveyor lubricator has universal head that will pick up trolleys of various makes on the same conveyor.



Automatic conveyor lubricator has 1) 2-gal reservoir, 2) crown regulator and lubricator, 3) frame, 4) cam-located nozzle, 5) booster air cylinder and 6) nozzle and pick-up assembly

The lubricator is a self-contained unit which is mounted on the trolley rail and actuated by the moving conveyor. As the trolley wheel approaches the lubricator, the wheel engages the nozzle of the pumping unit which is then brought in contact with the grease fitting.

The trolley wheel carries the nozzle with it; and when the nozzle is pointing straight at the trolley, a measured amount of lubricant is discharged under pressure into the wheel bearings. The nozzle is carried slightly beyond this center position and then released from the trolley to return to its pick-up position.

At the time the lubricant is discharged, the nozzle is tightly sealed against the grease fitting, and a positive shut-off valve in the nozzle eliminates drippage.

A twelve-pound reservoir and air control panel are furnished as standard equipment. This type of lubricator requires only compressed air for its operation, the volume of which is insignificant.

Each unit is adjustable as to the quantity of lubricant discharged into each bearing — from 0 to 0.1 cubic inch.

The unit can handle a wide range of lubricants from light oil to heavy fiber greases.

(Automatic Conveyor Lubricator is manufactured by J. N. Fauver Company, Inc., Dept. P&PSE, 51 West Hancock, Detroit 1, Mich.)

Circle 9563 inside back cover.

Temperature adjustment is easy on hot water tempering valve

For use on tankless heaters or storage tanks supplying hot water, a tempering or mixing valve features temperature adjustment dial on the top. This arrangement permits easy setting of desired water temperature without use of tools.

Temperature can be set between 110° and 180°F.

Made of brass and stainless steel, the valve utilizes a hermetically sealed thermostatic element which has a positive action over a long life.

Valve is currently offered in ½" size with all connections for sweat copper.

Dial on top is for adjusting water temperature between 110° and 180°F

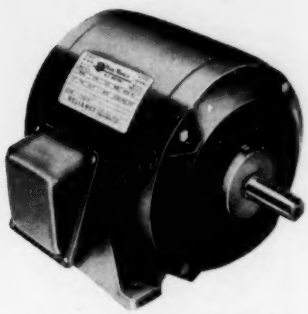
("Tempo" Type TMA hot water tempering valve is manufactured by A. W. Cash Valve Mfg. Corp., Dept. P&PSE, PO Box 191, Decatur, Illinois.)

Circle 9564 inside back cover.

AC motors designed for frequent starts and stops

Line of integral-horsepower AC motors is available in sizes from one through 250 hp in protected (open), weatherproof, totally enclosed, corrosion-proof and explosion-proof enclosures and for all standard speeds and voltages.

Designs include polyphase, ball-bearing, vertical and horizontal mounting arrangements with feet or footless, with NEMA C-face, D-flange or P-base brackets.



Low inertia rotor and double-end ventilation eliminate risk of injurious overheating

One of the principal features of the line is the low-inertia, fast-accelerating rotor. Constructed of pressure-cast aluminum, the rotor is dynamically balanced to movement tolerances as precise as 0.0002 of an inch. The low-inertia rotor and increased accelerating torque combine with improved double-end ventilation to provide frequent stops and starts without risk of injurious overheating.

The rugged cast-iron frame of the open motors protects from dripping or splashing liquids and has a 40°C temperature rise, continuous duty, with a 15% service factor.

A special metering plate automatically regulates flow of just-the-right amount of grease to the double-shielded ball bearings as needed. Automatic grease relief along the shaft eliminates overgreasing, while a special, tight, steel grease-retainer on the inside of the bearings keeps dirt from entering the bearings and prevents grease from passing into the motor interior.

Slot-cell insulation is laminated Mylar paper; the phase insulation is varnish glass. Molded, plasticized top and mid-sticks and vinyl glass sleeving on the leads complete the balanced insulation system.

Large conduit box is diagonally split to expose the leads for convenient connection. Positive, permanent lead markings of each wire provide instant identification of leads to minimize connection time.

("Duty Master" AC motors are manufactured by Reliance Electric and Engineering Company, Dept. P&PSE, 24701 Euclid Ave., Cleveland 17, Ohio.)
Circle 9565 inside back cover.

One way to protect flexible metal hose lines

Ease of installation, thermal and chemical resistance, flexibility and long service life are features of plastic coil sleeve which serves as a protector for various metal hoses ranging in size from ¼" to 2" in diameter.

Plastic sleeve for hoses up to ⅝" diameter is supplied in coils up to 50 ft in length, and for larger size hoses, in 25-ft lengths. The lightweight sleeve is unaffected by air, water, oil, gasoline and most other fluids, including hydraulic oils. Besides protecting hose lines from abrasion, the sleeve also insulates in hot applications, such as steam-carrying lines, where metal braid of hoses might burn operators. The sleeve will retain its shape and flexibility under temperatures from −20°F to 200°F. Installation is simple: sleeve is cut to length, either with an ordinary hacksaw or hose cut-off machine. It is then fitted onto the hose with a simple winding motion (see illustration).

(Plastic Coil Sleeve is manufactured by Aeroquip Corporation, Dept. P&PSE, Jackson, Michigan.)
Circle 9566 inside back cover.

Shaft-mounted speed reducer line expanded

An expanded line of shaft-mounted speed reducers now includes a 25:1 double reduction series in eight sizes.

Design is such that both 15:1 and 25:1 gear ratios are now available in housings of identical dimensions. Output speeds range from 12 to 400 rpm.

This is the largest shaft-mounted speed reducer offered from stock. Its reduction ratio is 24.73:1 and is rated at 154 hp at 75 rpm

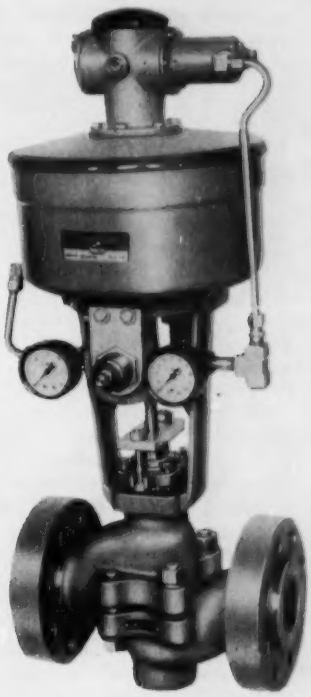
Also incorporated in the design is an improved method of attaching the torque arm to the reducer case, employing a saddle-type bracket for greater strength and better balance.

("Torque Arm" speed reducers are manufactured by Dodge Manufacturing Corporation, Dept. P&PSE, Mishawaka, Ind.)
Circle 9567 inside back cover.

Control valves have ductile iron bodies

Line of control valves and handwheel valves are now available with ductile iron bodies.

Ductile iron (nodular iron) is a cast metal which has the corrosion resistance of gray cast iron and ductility and strength approaching that of carbon steel.



Ductile iron has corrosion resistance of cast iron and strength of steel

It is lower in cost than steel or bronze and is a suitable replacement for both on many services where cast iron is not satisfactory. It has a higher temperature-pressure rating than cast iron or bronze.

The valves are available in the straight-through design in sizes ¾" through 6" with 150-300 lb ASA raised-face integral flanges. They are also available with screwed connections in sizes through 2".

(Ductile iron valves are manufactured by Conoflow Corporation, Dept. P&PSE, 2100 Arch St., Philadelphia 3, Pennsylvania.)
Circle 9568 inside back cover.

Vertical induction motors feature both hollow and solid shafts

High-speed, squirrel-cage, induction vertical motors in all types of enclosures are offered in 150 hp and up.

Especially suited to unattended, intermittent-duty installations, the motors are available with either solid or hollow shafts.

Deep-bar copper rotors with extended ends for maximum heat dissipation are ventilated to permit air passage through cores and windings to attain lower, more uniform internal temperatures.

All rotors are dynamically balanced. Hollow shafts are drilled and bored concentric to the outside diameter of the shaft to provide ample clearance for the pump shaft.

Solid shafts are of minimum length to maintain a critical speed well above the operating range to provide vibration-free operation.

To provide necessary protection for pump and motor and to permit required adjustments for hollow shaft vertical motors, a choice of three types of couplings are available:

Non-reversing rachet coupling protects against reverse rotation under back-pressure conditions, self-releasing coupling will not allow the pump shaft to unscrew if the motor rotation is reversed, and rigid coupling locks pump and motor shaft when pump exerts up-thrust.

(Vertical induction motors are manufactured by Ideal Electric and Manufacturing Co., Dept. P&PSE, Mansfield, Ohio.)
Circle 9569 inside back cover.

Pliable metal packing conforms to any shape

Suitable for high pressures and temperatures, formable lead-base packing won't deteriorate or harden. Consequently it never needs to be replaced, only added to.

It also eliminates the need for various sizes of packings. It comes in one-pound wrapped cakes and is easily broken off and stuffed into the box, gland or shaft by hand.

Being pliable, it conforms to the rod or shaft and makes a perfect bearing surface.

Its inherent self-lubricating properties, derived from its antimony content, results in frictionless running.

Metallic packing comes in one-lb cakes, is easily broken off and stuffed into boxes or glands

It can be used in valves, stuffing boxes, pistons, cylinders, valve stems, centrifugal or rotary shafts in such equipment as: steam engines, pumps, traction engines, compressors, turbines, hydraulic presses, and steam winches.

It will withstand temperatures to 700°F and is impervious to water, steam, acid or oils.

("Lonsor" packing is product of Newage Industries, Inc., Dept. P&PSE, 222 York Road, Jenkintown, Pa.)
Circle 9570 inside back cover.

Won't let machine start unless safety door or guard is locked

Foolproof, failsafe device insures that electrically powered or operated equipment cannot be started unless the safety door or guard is automatically locked in place. It is also a good protective device on equipment involving high voltage.

Basically, the lock consists of a split transformer, one half of which is fastened to the machine itself and the other to the access door, operating lever, handle or other closing means.

Only when both halves of the transformer are properly mated can the machine starting switch in the main circuit be closed.

Likewise, the guard or door cannot be opened until the machine has been switched off.

The design of the lock is such that when the two transformer halves are brought together exactly in the proper position and the starting switch turned on, the pivoted half of the transformer is attracted to the other half, mechanically locking both together so that no lateral movement is possible.

This also allows enough current to be generated in the secondary winding to close the machine power circuit.

Some typical applications include centrifuges, presses, material handling systems, crushing machinery and high voltage systems.

(Lance electric safety lock is product of Lindly & Company, Inc., Dept. P&PSE, 248 Herricks Rd., Mineola, Long Island, N.Y.)
Circle 9571 inside back cover.

Allows rapid balancing of cylinder loads in all engine types

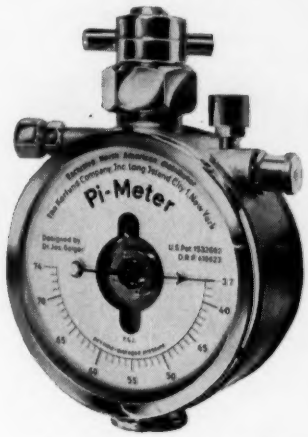
A performance meter for multi-cylinder diesel, gas, steam and gasoline engines permits rapid adjustment and balancing of cylinder loads of the engine and the measurement of power output.

By being quickly attached to a cylinder's pressure tap, the instrument reads time-averaged pressure which is related to indicated mean effective pressure. Since this pressure is read directly on the meter's dial while engine is running, it can be used easily by non-technical personnel.

Five different springs within the instrument will accommodate a wide enough pressure range to adapt it for use with any type of reciprocating engine.

Balancing loads on the cylinders of the engine assures that each cylinder is providing its fair share of the total output for maximum efficiency and lowest fuel costs.

The meter has no upper



Meter reads pressure in cylinder while engine is running

speed limit (its lower limit is 80 rpm), and, therefore, can be used on high-speed engines in the field.

For continuous operation, it is equipped with means for cooling and lubrication. Water cooling can be applied to the instrument through a threaded connection. For lubrication of the piston contact surfaces during operation, the instrument incorporates a hand pump with check valve.

The instrument weighs approximately 9 lb and measures 5" in diameter by 3" thick.

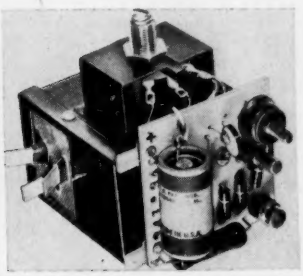
(Pi-Meter is manufactured by The Korfund Company, Inc., Dept. P&PSE, 4813 32nd Place, Long Island City 1, New York.)
Circle 9572 inside back cover.

For automatic control of battery charging and I-v circuits

Electronic device, developed for use as a storage battery "Automatic Charging Controller," also has broad application in low-voltage circuits as an electronic switch or phase shift controller. Some typical applications

of this kind are as a voltage sensitive switch, pulse switch, and transient or peak voltage detector.

Used in a battery charger, the device permits the operator to make connections, turn on the switch and leave it unattended. The battery will be charged to a predetermined



Transistor device operates as a grid controlled gas rectifier

level, and then the charging rate is reduced to a predetermined minimum.

Since the charger is controlled by the actual condition of the battery, as well as temperature conditions, the possibility of overcharging or undercharging is eliminated.

The transistor device operates like a grid-controlled gas rectifier; i.e. it is activated when the input voltage reaches a predetermined value, and then holds until the input voltage is removed.

(For more information on "Voltage Sensitive Trigger" and its application with storage batteries, contact Marquette Manufacturing Company, Inc., Dept. P&PSE, 307 E. Hennepin, Minneapolis 14, Minnesota.)

(More information on "Voltage Sensitive Trigger" and its application to control systems may be obtained from American Electronics Company, Dept. P&PSE, 2801 37th Avenue, NE, Minneapolis 18, Minnesota.)
Circle 9573 inside back cover.

For more information on items reported in the New Developments section circle corresponding numbers on reader service card opposite inside covers.

Don't call the doctor; diagnose equipment ills with a stethoscope

Many industrial uses — from diagnosing faults in machines and pipe lines to testing pressure-tightness — are being found in industry for a low-cost stethoscope.

With this rugged but sensitive instrument, engineers can detect sounds that would otherwise be inaudible. The faintest knocks, taps, creaks and leaks can be plainly heard.

Some applications already found include: tuning up motors and compressors, checking running machinery, detecting and diagnosing me-

Stethoscope can locate such things as loose joints, poor bearings, and gas leakage

chanical flaws (loose joints, poor bearings and valves, strains, leakage of gas or liquids) and many other such jobs.

(Industrial stethoscope is product of Edmund Scientific Company, Dept. P&PSE, Barrington, N.J.)
Circle 9574 inside back cover.

Adjust lube discharge from atomizing nozzle for spray size, shape

Utilizing only one moving part, an adjustable-discharge atomizing nozzle offers ease, speed and low maintenance in spray applications of lubricants and other liquid coatings.

Simple adjustment gives precise control over quantity of flow and size and shape of spray pattern. Positive shut-off at the nozzle orifice insures no-drip operation.

Manifold air and liquid connections allow nozzle assembly to be removed without disturbing nozzle mounting or hose lines.

The nozzle is designed for operation at atomizing pressures from 1 to 100 psi.

(Nozzle #2000 is product of CALCO (Columbus Automatic Lubrication Co.), Dept. P&PSE, 81 E. State St., Columbus 15, Ohio.)
Circle 9575 inside back cover.

Absorbs pipe movement where piping changes direction

Having application in industrial plants, on oil and gas lines, power plants, steam lines, water works, gas works and wind tunnels, line of pressure-balanced expansion joints absorb pipeline movement without imposing pressure thrust.

They are frequently used to protect turbine housings and exhaust connections, stage bleeders, condensers, pumps, and rotating equipment such as turbines and blowers.

Installed at elbows or points where piping changes direction, the expansion joints use a counterbalancing outer bellows to absorb line pressure where anchoring is not practical.

This is how the joints work: Pressure in the expansion joint surges against the elbow and against one end of the joint which is closed. Thus, the force exerted by internal pressure against the line is balanced by an equal and opposite force, transmitted to the line through the tie rods from the blanked end of the balancing joint.

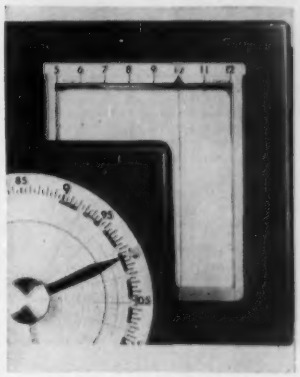
Available in diameters from 3 inches to 50 feet for temperatures from −320°F to +1600°F and pressures up to 2500 psi, they are available with a variety of bellows.

(Pressure-balanced expansion joints are manufactured by Zallea Brothers, Dept. P&PSE, 815 Locust St., Wilmington 99, Del.)
Circle 9576 inside back cover.

Two recorder-controllers for steam temp control have many safeguards

Two space-saving models of a recording-controller for steam temperature control measure 12 inches high and 11 inches wide, yet offer easy readability.

The Model S strip chart is best for detailed records with its 6½-inch linear scale. The Model R is recommended for bold indication — even slight deviations in temperature are



Two models are available—strip chart for detailed record and circular for bold indications

easily seen from a distance. Curves are easily read on this model since they are plotted along a straight-line radial scale.

With its range of 500° to 1200°F, the instrument has an accuracy of better than ±0.3%, while sensitivity is better than ±0.1%.

Its control slidewires and adjustable alarm contacts are mounted on a rigid shaft for permanent alignment.

Other safeguards include a factory-set high-alarm contact to lock out control and sound an alarm in the event of a severe disturbance, or a thermocouple or amplifier failure.

Amplifier and thermocouple fail-safe circuits are also provided for added protection and safety.

(Speedomax H Recording Controllers are manufactured by Leeds & Northrup Company, Dept. P&PSE, 4934 Stenton Ave., Philadelphia 44, Pennsylvania.)
Circle 9577 inside back cover.

NEW LITERATURE

for effective plant and power services operation

Reviews of books and industrial bulletins describing equipment, supplies, services

Describes way to identify wires

Line of self-adhering markers for all size wire, cable and harness identification is described in 4-page color brochure.

A variety of stock and special markers are included for use in high temperature applications, and for resistance to water, oils, solvents and fungus.

Special markers are mentioned for electrical and electronic parts and components identification, calibration, certification, serial numbering, instruction, lubrication, testing, etc.

Also a line of pre-printed insulation sleeving and tubing from a complete range of standard and special materials covering a majority of government and industrial usage conditions is included.

(Brochure #EZ4-1 is available from Westline Products Division of Western Lithograph, Dept. P&PSE, 600 East 2nd Street, P.O. Box 2980 Term. Annex, Los Angeles 54, California.)
Circle 9578 inside back cover.

Curing concrete

A combination curing agent and seal for new concrete is announced in two-page data sheet.

The material saves labor cost by eliminating constant wetting down of concrete during the curing stage, and also the use of straw, burlap or paper.

(File No. 3-B-1 is issued by The Tremco Manufacturing Company, Dept. P&PSE, 10701 Shaker Boulevard, Cleveland 4, Ohio.)
Circle 9579 inside back cover.

How to keep boiler insulation effective

Insulation and insulating cement on boilers often crack from expansion and contraction in service.

A completely jointless mastic film of high elastic strength and fire-resistance seals cracks and prevents air leaks through the insulation and cement.

Specifications and method of application are given on this material in two-page bulletin.

(Bulletin M-2-A is available from Benjamin Foster Company, Dept. P&PSE, 4635-37 W. Girard Ave., Philadelphia 31, Pa.)
Circle 9580 inside back cover.

Portable laboratory demineralizer

A self-contained, portable laboratory or plant demineralizer is for use whenever small quantities of exceptionally high quality water are required. It will remove all but minute traces of ionized solids from the water including such weakly ionized material as silica and carbon dioxide.

The ion exchange material is composed of cation and anion resins, intimately mixed. The resultant effect is that of an almost infinite number of separate cation and anion exchange processes, according to 4-page bulletin.

Pure water can be produced rapidly by simply connecting the unit to any convenient water source, such as a city water tap.

(Bulletin 595 is available from Betz Laboratories, Inc., Dept. P&PSE, Gillingham & Worth Streets, Philadelphia 24, Pennsylvania.)
Circle 9581 inside back cover.

Network transformers for secondary systems

Network transformers in ratings from 300 to 2500 kva and 5 to 34.5 kv for AC secondary network systems are described and illustrated in two-color, 16-page bulletin.

The new network transformers are said to have improved sound level, high short-circuit strength, improved overload capability and higher corrosion resistance.

Bulletin illustrates core and winding design, new panel radiators, an improved "sandwich" paint finish, and new welded low-voltage bushings.

In addition, nitrile gaskets provide tight, long lasting seals on both high and low-voltage ends of the network transformers.

(Bulletin GEA-5024A is issued by General Electric Co., Dept. P&PSE, Schenectady 5, New York.)
Circle 9582 inside back cover.

Plastic protectors for tubes

Full details on condenser and heat exchanger tube protectors that extend the usable life of old tubes and increase the life of new tubes are given in four-page bulletin.

The protectors are available in three plastics — nylon, polyethylene and phenolic resin. They resist corrosion, chemical and fungus attack, are impervious to oils and greases, and will withstand temperatures to 250°F.

(Bulletin P-335 is available from Crane Packing Company, Dept. PI-5, 6400 Oakton St., Morton Grove, Ill.)
Circle 9583 inside back cover.

Measures flow rates in open channels

Designed specifically for water, sewage and industrial waste applications, in-stream flow transmitter is designed for installation on weirs and other head-area devices for accurate measuring of rates of flow in open channels.

Two-page bulletin contains a cut-away installation photograph of the unit, descriptive text, features, capacities and a section on its method of operation.

Features of the unit include elimination of stilling wells, flushing systems, piping sediment tanks and frequent cleaning.

(Bulletin 230.20A-3 is issued by B-I-F Industries, Inc., Dept. P&PSE, 345 Harris Ave., Providence 1, R.I.)
Circle 9584 inside back cover.

Power factor capacitor data

Construction features of substation and pole-mounted power factor capacitors are described in eight-page bulletin.

Available in ratings of 25 and 50 kvar in 2400 through 7960 volts, the capacitors are factory-assembled for single-row or multi-row configuration or for stacking racks to users' requirements.

(Bulletin 32B9421 is issued by Allis-Chalmers Manufacturing Company, Dept. P&PSE, Milwaukee 1, Wis.)
Circle 9585 inside back cover.

Shows arc welding accessories

Complete line of arc welding cable connections and accessories is described and illustrated in 12-page bulletin.

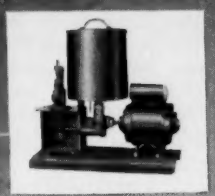
Accessories described include: electrode holders, ground clamps, cable splicers and terminal connectors.

("Twecolog" No. 12 is issued by Tweco Products, Inc., Dept. P&PSE, PO Box 666, Wichita, Kansas.)
Circle 9586 inside back cover.

precision metering

Rugged, trouble-free Manzel Chemical Feeders give accurate, dependable metering of chemicals, acids, oils and other liquids. Wide range of capacities, feeds and delivery rates.

MANZEL



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Manzel

320 Babcock Street
Buffalo 10, N. Y.

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Circle 9587 inside back cover.

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PLANT and POWER SERVICES ENGINEER is looking for good nomographs designed to simplify calculations necessary to efficient plant and power services. If you have such a nomograph that has been helpful to you in your work — and it has not been published before — send it to:

Data Editor
PLANT and POWER SERVICES ENGINEER
111 E. Delaware Place
Chicago 11, Illinois

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Plant-Power Services Engineer

nomograph 36

Sizing Control Valves

R. L. PATTON
Supervisor, Equipment Design & Selection
Gulf Oil Corp., Port Arthur, Texas

These three nomographs (Pages 41, 43, 45) are designed for quick determination of double-port control valve sizes. By selection of the proper chart, a minimum of conversion of units is required.

Based on averages for valves of the leading manufacturers, these charts permit size determination at an early stage, before bids have been received for selection of manufacturer.

By adding together equivalent orifice areas required for handling the vapor and liquid quantities involved, one has a fairly reliable method of dealing with the case of a liquid which flashes in passing through the control valve.

The charts may also be used for determining the capacity of an existing valve at a given pressure drop, or the pressure drop at a given flow rate.

Part I — Gas Volume Basis

To determine control valve size, when calculations are to be based on a gas volume basis, this nomograph is based on the equation:

$$d = \sqrt{\frac{CFH\,(w)^{\frac{1}{2}}}{550\,(P_1 - P_2)^{\frac{1}{2}}}}$$

where

d = control valve size, inches
CFH = flowing conditions, cu ft/hr
w = density at flowing conditions, lb/cu ft
P_1 = initial or upstream pressure, psi
P_2 = final or downstream pressure, psi

Typical Example

The example shown by dotted lines indicates that for 150,000 cu ft per hr of gas which has a specific gravity of 1.0 (at flowing conditions) at a pressure drop of 200 psi, a 2½-inch control valve is required.

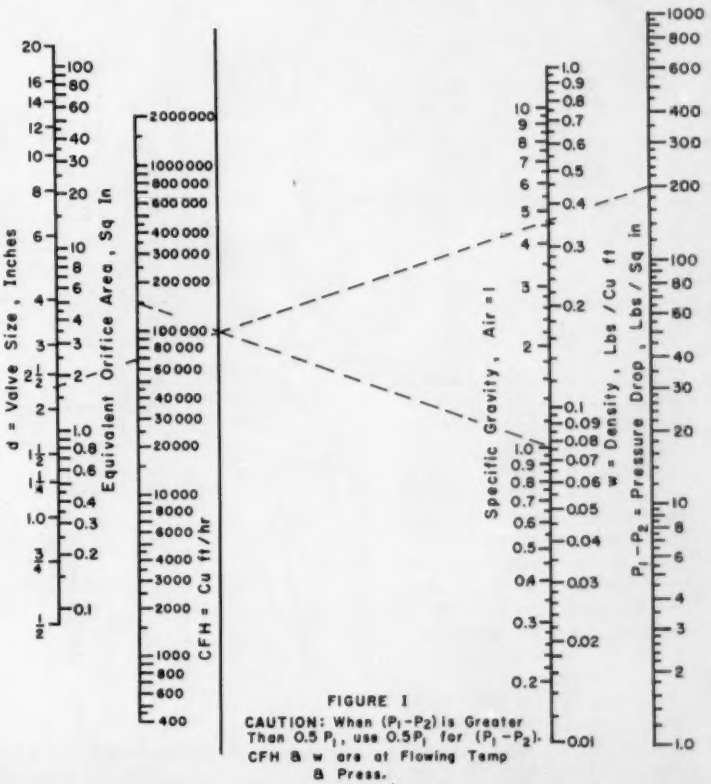

d = Valve Size, Inches
Equivalent Orifice Area, Sq In
CFH = Cu ft/hr
Specific Gravity, Air = 1
w = Density, Lbs/Cu ft
P1-P2 = Pressure Drop, Lbs/Sq in

FIGURE 1

CAUTION: When $(P_1 - P_2)$ is Greater Than 0.5 P_1, use 0.5 P_1 for $(P_1 - P_2)$. CFH & w are at Flowing Temp & Press.

Condenses technical data on pressure tubing

Four-page bulletin furnishes condensed data on the mechanical and physical properties of seamless and welded carbon steel tubing for use at elevated temperatures and pressures in heat transfer equipment.

Information on the various fabrication operations performed on such tubing is supplied.

(Technical Data Card 142B is available from Babcock & Wilcox Company, Tubular Products division, Dept. P&PSE, 161 E. 42nd St., New York, N. Y.)
Circle 9588 inside back cover.

How to protect insulation on outdoor refrigeration

Guide specifications for the application of mastics to insulation on outdoor refrigeration and air-conditioning equipment are given in two-page bulletin.

The guide is presented in step-by-step form.

(Bulletin M-1-A is available from Benjamin Foster Company, Dept. P&PSE, 4635-37 W. Girard Ave., Philadelphia 31, Pa.)
Circle 9589 inside back cover.

Discusses underfloor wiring systems

Compact underfloor wiring systems for use with cellular steel floor construction are described and illustrated in 4-page bulletin.

Two types are shown—the 14,000 Series offers a full 9.2-square inch capacity. The 15,000 Series provides a full 20.294 square inches of duct capacity. Both systems can be combined in one installation by the use of a special connecting device.

(Bulletin No. 692 can be obtained from National Electric Division, H. K. Porter Company, Inc., Dept. P&PSE, Porter Bldg., Pittsburgh, Pa.)
Circle 9590 inside back cover.

All kinds of instruments shown in catalog

Twenty-four page catalog covering a full line of panel instruments including AC meters, DC meters, elapsed time meters, and shunts and current transformers has just been issued.

Three types of AC meters, all with iron vane mechanisms, are covered: solder-sealed, gasket-sealed, and Bakelite. There are five types of DC meters, all with D'-Arsonal movements: solder-sealed, gasket-sealed, Bakelite, ruggedized solder-sealed, and ruggedized gasket-sealed.

Photographs, dimensional drawings, tables of ratings, and complete descriptive data are given, along with outlined construction details.

(Bulletin 3-15 is issued by Federal Pacific Electric Co., Dept. P&PSE, Fifty Avenue L, Newark 1, N.J.)
Circle 9591 inside back cover.

Electronic insulating material explained

Seamless tubing in which an epoxy CL high heat resin system is combined with continuous braided fiberglass sleeving to give a rigid electrical insulating material of great strength is described in a 2-page bulletin.

For use on electrical and electronic devices the product has obtained wide usage in printed circuitry, condenser and rectifier, sheaths, coil forms and bobbins, motor slot wedges, and transformer core insulators. Also airborne and ground antenna masts, aircraft fuel gauge probes, electrical conduit, structural supports, chemical piping and others.

(Bulletins MSD-54A and MSD-54B are issued by Chemfab Corp., Dept. P&PSE, 40-30 23rd Street, Long Island 1, New York.)
Circle 9592 inside back cover.

"Gentlemen, let me introduce you to the new chairman of our policy-making committee."

Gives how-to-solve help to make-up air problems

An often-neglected problem occurring in industrial and commercial buildings using forced exhaust fans is the need for make-up air.

Four-page bulletin describes how make-up air properly introduced and tempered will overcome negative air pressure and eliminate many problems.

The bulletin contains a schematic diagram and instructions for properly wiring the control arrangement for make-up air installations.

(Bulletin EN-5911 is available from Reznor Manufacturing Company, Dept. P&PSE, Mercer, Pa.)
Circle 9593 inside back cover.

Multiple-plate clutches shown

Multiple-plate clutches, including a single clutch and a duplex unit built on a single hub for machine tool application, are featured in 4-page bulletin.

Both models are available in ten sizes with plate diameters ranging from 3″ to 9″. They can be furnished for either dry-type or wet-type operation.

Also included is a supplementary series of clutches which include three sizes of clutches (2½″, 10″ and 12″).

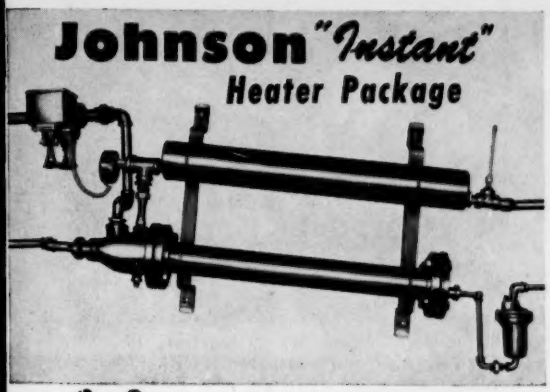
(Bulletin 134-C is issued by Twin Disc Clutch Co., Dept. P&PSE, Racine, Wis.)
Circle 9594 inside back cover.

Catalog describes tube fittings

Over 150 illustrations show complete line of tube fittings in 20-page catalog. Chapters deal with subjects such as: how to order, "O-ring" seal hydraulic tube fittings, and hydraulic accessories.

(Catalog "Tube Fittings" is available from Lenz Company, Dept. P&PSE, Dept. 68-A, 3301 Klepinger Road, Dayton 16, Ohio.)
Circle 9595 inside back cover.

Johnson "Instant" Heater Package



Easy to install... just hang it on a wall

Here's a hot water source specially engineered for today's industrial plants. Hooks up to steam lines anywhere, produces hot water instantly on demand. No bulky, expensive storage tanks. No residual heat to cause scalding; holds maximum discharge temperature within 10° of setting. Johnson heater design achieves rapid, efficient heat transfer with only a few simple rugged parts — hooks right up to high pressure steam lines; no reducing valves needed. Capacities up to 900 gph. (for 100° rise) depending on steam supply pressure.

Write for full information

THE JOHNSON CORPORATION
807 Wood St., Three Rivers, Mich.

Circle 9596 inside back cover.

IS YOUR INSTRUMENTS LITERATURE FILE INCOMPLETE

A new bulletin on instruments is being offered. You'll find a review of this bulletin in the NEW LITERATURE section, starting on page 40. This bulletin is just one of some 43 selected pieces of plant and power services literature reviewed in this issue.

CUT HERE AND FILE

Sizing Control Valves

Part II — Liquid Volume Basis *from page 41*

To determine control valve size when calculations are to be on a liquid volume basis, one should use this nomograph based on the equation:

$$d = \sqrt{\frac{BPH\,(G)^{\frac{1}{2}}}{12.4\,(P_1 - P_2)^{\frac{1}{2}}}}$$

where,

d = control valve size, inches

BPH = flow rate, gpm or barrels/hr
G = specific gravity
P_1 = initial pressure, psi
P_2 = final pressure, psi

Typical Example

The example shown by dotted lines indicates that for 70 gal per minute (100 barrels per hr) of 1.0 specific gravity liquid at a pressure drop of 5 psi, a 2-inch control valve is required.

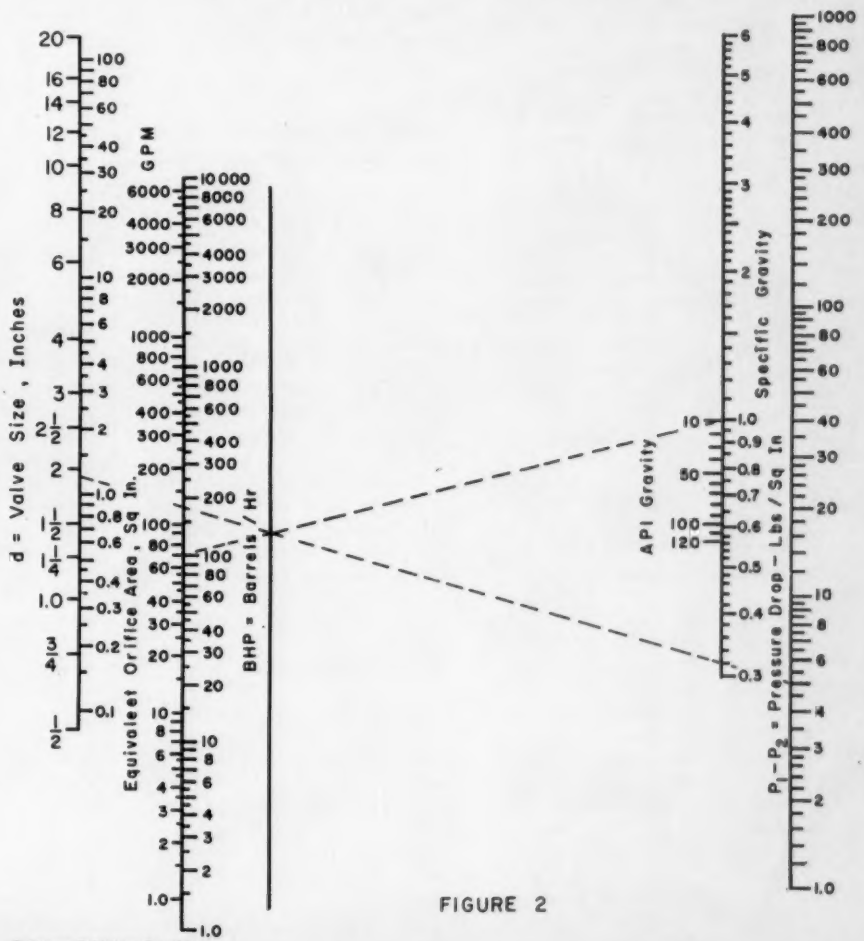

d = Valve Size, Inches
GPM
Equivalent Orifice Area, Sq In.
BHP = Barrels / Hr
API Gravity
Specific Gravity
P1 - P2 = Pressure Drop - Lbs / Sq In

FIGURE 2

© Putman Publishing Co. 1959

How to use mastics on cold duct, pipe

Insulation on concealed air conditioning ducts and cold water piping should be covered with an effective moisture barrier. Care should be taken to use a fire-resistive mastic where required by Codes.

Two-page bulletin outlines mastic to use and how to apply it.

(Bulletin M-1-B is issued by Benjamin Foster Company, Dept. P&PSE, 4635-37 W. Girard Ave., Philadelphia 31, Pennsylvania.)
Circle 9597 inside back cover.

Indicating recorder instruments

Indicating recorders and indicating recorder-controllers that record and indicate any variable measurable as voltage or resistance change are featured in 4-page, two-color bulletin.

Descriptions and applications for both units are given along with information on sensitivity, accuracy, control and alarm function, installation, operation and maintenance.

(Bulletin No. 66 is available from Thermo Electric Co., Inc., Dept. P&PSE, Saddle Brook, N.J.)
Circle 9598 inside back cover.

Power convertors are custom-designed

Line of packaged, fully housed frequency-converting motor-generator sets is subject of four-page folder.

Custom-designed systems approach to power converting systems is described with emphasis on one particular system. Also, first printed information on a static-exciter voltage-regulator is made available.

(Form MG-659 is issued by Kato Engineering Company, Dept. P&PSE, Mankato, Minnesota.)
Circle 9599 inside back cover.

Shows savings from boiler blowoff

Possible savings in both labor and operating costs through the use of continuous boiler blowoff systems rather than intermittent manual blowoff are presented in bulletin on continuous blowoff equipment.

In a typical example of a 600-psig boiler evaporating 100,000 lb/hr, heat recovered during a 4000-hr period amounted to a fuel saving of $3080.

Quick reference charts are given to enable boiler users to estimate potential heat savings for various continuous blowoff arrangements.

(Publication 5700-A is available from Cochrane Corporation, Dept. P&PSE, 17th Street below Allegheny Avenue, Philadelphia 32, Pa.)
Circle 9600 inside back cover.

Electric arc furnace transformers shown

Transformers for electric arc furnaces for steel, ferro-alloy, non-ferrous metal, and chemical industries are described in 24-page bulletin.

Tables of performance, electrical characteristics, dimensions, weights and estimating prices for units ranging from 750 to 35,000 kva, with input voltages from 2.4 to 34.4 kv are given.

(Bulletin GEA-6236A is available from General Electric Company, Dept. P&PSE, Schenectady 5, N.Y.)
Circle 9601 inside back cover.

Submersible pumps

Bulletin on submersible pumps has detailed cross section drawings plus colored illustrations.

Applications covered include: plant water systems, irrigation, reservoir pumping, and municipal primary water supply.

(Bulletin No. 202 is issued by Layne & Bowler, Inc., Dept. P&PSE, Memphis 8, Tenn.)
Circle 9602 inside back cover.

Battery technology in handbook

Lead-acid battery technology handbook covers all phases of battery theory, operation and maintenance.

Captioned line drawings clearly indicate what goes on when a battery charges and discharges. Basic information is given on specific battery charges, charging and discharging cycles, positive and negative plate composition and other battery operation principles.

One section of the book gives instructions for placing batteries in service, operating and maintaining and charging the storage battery.

General repairs including replacing jars, covers, separators and installing, repairing and charging of plugs and receptacles. A table gives the ratios of parts of water to parts of acid required to obtain given specific gravities, when preparing electrolyte necessary for repairs.

(Bulletin GB-1896 is issued by Gould National Batteries, Inc., Dept. P&PSE, Trenton 7, N.J.)
Circle 9603 inside back cover.

Insulation specifications rewritten for power

A well known manual of insulation specifications has been re-issued in an enlarged and thoroughly revised form to include the power generation field as well as other fields covered by the earlier book.

The tables include the recommended thicknesses for both steam generating plants and process equipment based on average economic conditions for the industries.

Organized for convenient reference, the manual has an easy-to-read format and includes many photos which serve to clarify the text or exemplify the procedures to be followed.

(Manual IN-128A is issued by Johns-Manville, Dept. P&PSE, 22 East 40th St., New York 16, N.Y.)
Circle 9604 inside back cover.

Mechanical coupling data sheet

Two-page data sheet includes diagram of couplings and parts for mechanical power transmission.

The bulletin also includes a table of sizes and bores, and complete information on design and construction of the units which permits up to a 5° misalignment capacity.

(Bulletin No. 62 is issued by John Waldron Corp., Dept. P&PSE, Box 791, New Brunswick, New Jersey.)
Circle 9605 inside back cover.

Steam control case history

Using separate boilers to back up utility company extraction turbines and pressure reducing desuperheating stations furnishing steam to a chemical plant posed interesting control problems because of the uniqueness of the application.

How the problems were solved is explained in 12-page bulletin. A full description of the control system with schematic diagrams and photographs tells how the company was able to meet the demands of both electrical power and steam consumers with good plant efficiency.

(Bulletin No. 1057 is available from Blaw-Knox Company, Copes-Vulcan Division, Dept. P&PSE, Erie, Pa.)
Circle 9606 inside back cover.

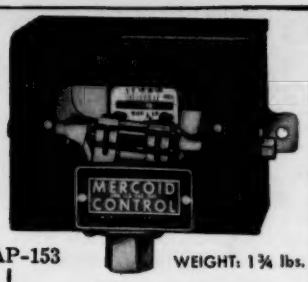
How to isolate vibration

Isolaters can isolate vibration, attenuate noise and reduce shock to lengthen equipment life and decrease maintenance costs.

Four-page bulletin describes line of isolaters, gives performance data in chart form, and tells how to select.

(Bulletin 59-04 is issued by Barry Controls, Incorporated, Dept. P&PSE, 700 Pleasant St., Watertown 72, Mass.)
Circle 9607 inside back cover.

NEW
SMALL, LIGHTWEIGHT
PRESSURE CONTROL



AP-153 WEIGHT: 1¾ lbs.

FOR MEDIUMS NOT INJURIOUS TO STEEL OR SILVER SOLDER

EXTERNAL ADJUSTMENT

CALIBRATED DIAL

HERMETICALLY SEALED MERCURY SWITCH

VISIBLE CIRCUIT

CASE: NEMA 1—Heavy gauge steel, cadmium plated. Steel cover (with glass front).

OPERATING RANGE

Adjustable Operating Range	Differential Fixed (Factory Set)	Maximum Surge Limits
1 to 20 psig	0.5 psig.	30 psig.

CIRCUIT

SP-DT HERMETICALLY SEALED MERCURY SWITCH (4A. 115V., 2A. 230V.)

Provides any of following operations:

1. *Single Pole—Cut-in high (close on rise)*
2. *Single Pole—Cut-in low (open on rise)*
3. *Single Pole—Double Throw*

WRITE FOR BULLETIN 02

THE MERCOID CORPORATION
4201 BELMONT AVE., CHICAGO 41, ILL.

Circle 9608 inside back cover.

IS YOUR INSULATION LITERATURE FILE INCOMPLETE ?

A new bulletin on insulation is being offered. You'll find a review of this bulletin in the NEW LITERATURE section, starting on page 40. This bulletin is just one of some 43 selected pieces of plant and power services literature reviewed in this issue.

CUT HERE AND FILE

Plant-Power Services Engineer

nomograph 38

Sizing Control Valves

from page 41

Part III — Gas or Liquid — Weight Basis

If the calculations for determining sizes of control valves are to be made on a weight basis for either gases or liquids, one should use this nomograph based on the following equation:

$$d = \sqrt{\frac{W}{550(w)^{\frac{1}{2}}\ (P_1 - P_2)^{\frac{1}{2}}}}$$

where

- d = control valve size, inches
- W = flow rate, lb/hr
- w = density at flowing conditions, lb/cu ft
- P_1 = initial or upstream pressure, psi
- P_2 = final or downstream pressure, psi

Typical Example

The example shown by dotted lines indicates that for one million lb per hr of fluid weighing 62 lb per cu ft at a pressure drop of 50 psi, a 6-inch control valve is required.

NOTE: Density scale is set up to handle steam at known temperature and pressure (absolute). To find density point, locate steam conditions and draw horizontal line from this point to density scale.

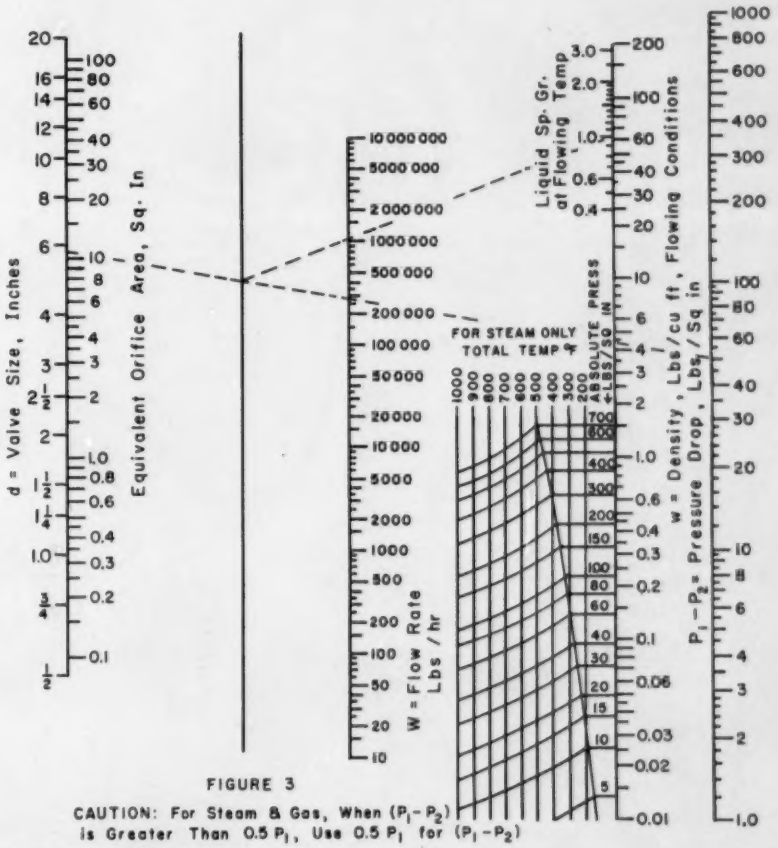
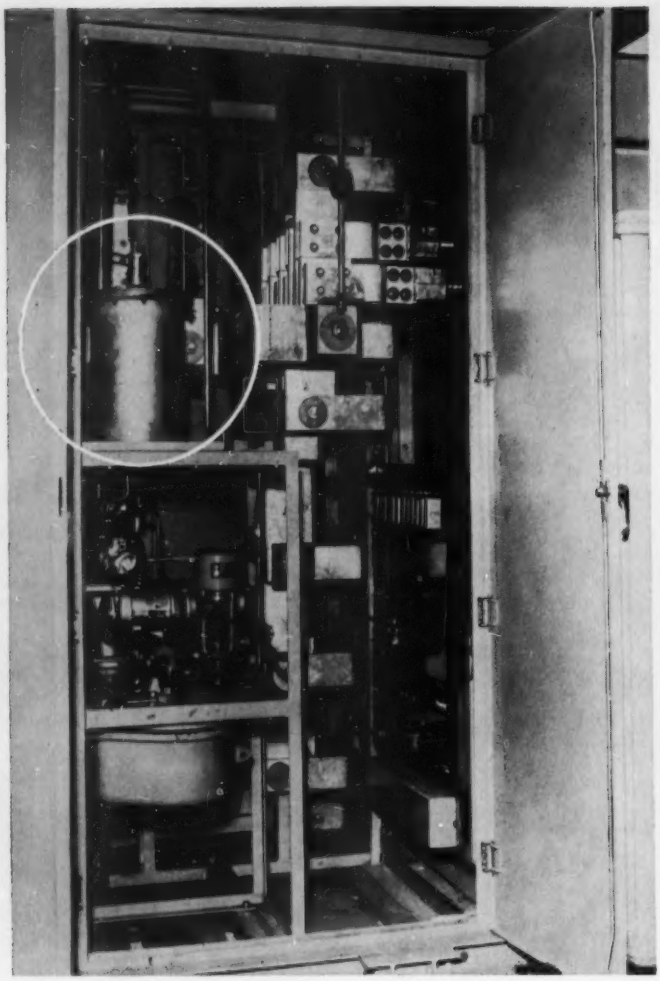

d = Valve Size, Inches
Equivalent Orifice Area, Sq. In
W = Flow Rate Lbs / hr
Liquid Sp. Gr. at Flowing Temp
FOR STEAM ONLY TOTAL TEMP °F
ABSOLUTE PRESS ← LBS/SQ IN
w = Density, Lbs/cu ft, Flowing Conditions
P1 - P2 = Pressure Drop, Lbs/Sq in

FIGURE 3

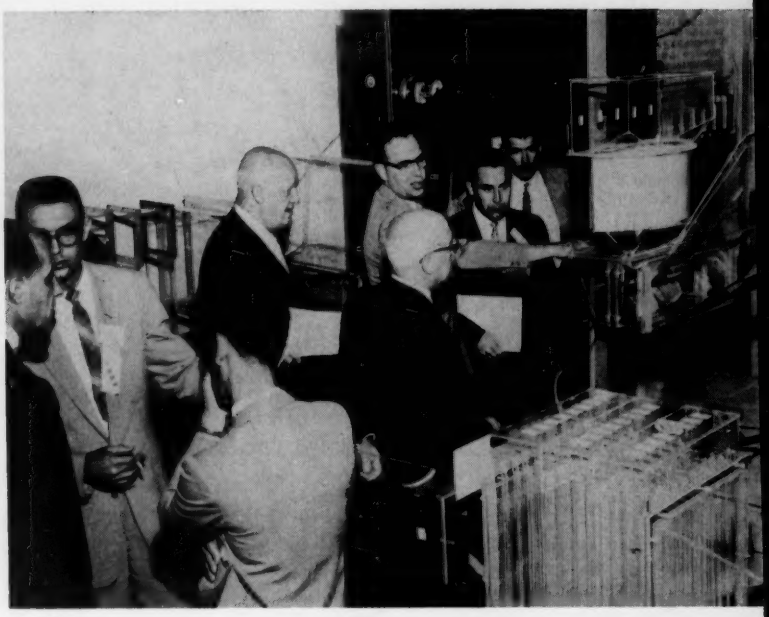
CAUTION: For Steam & Gas, When $(P_1 - P_2)$ is Greater Than 0.5 P_1, Use 0.5 P_1 for $(P_1 - P_2)$

© Putman Publishing Co. 1959

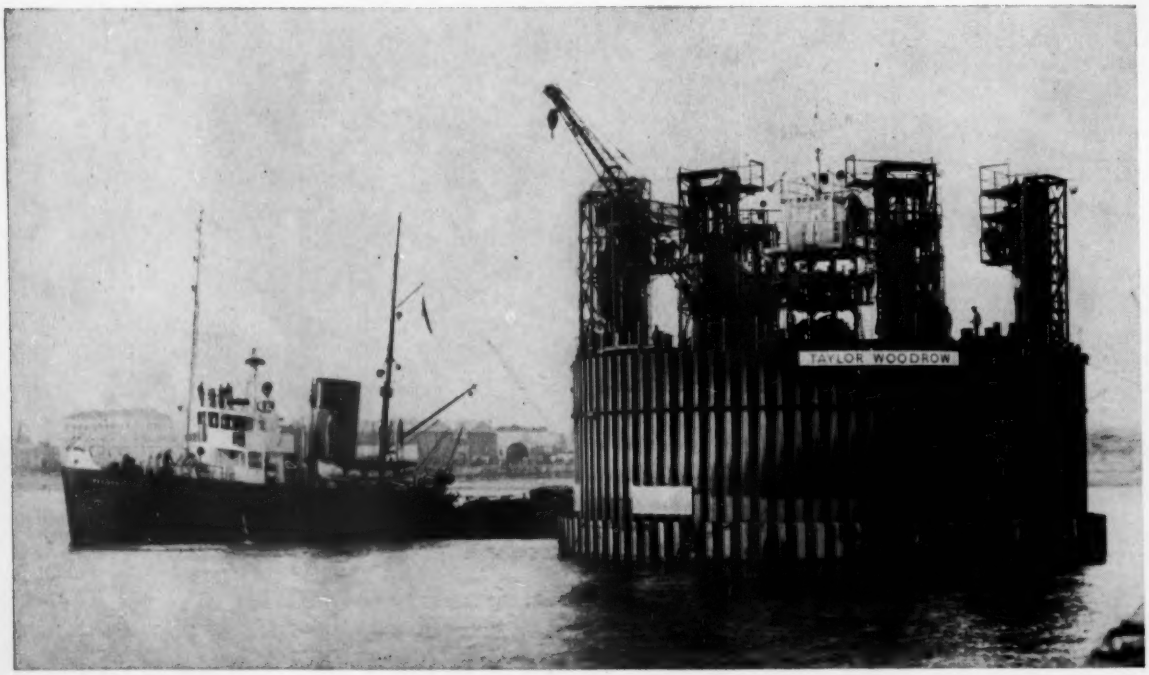
PHOTO NEWS



COMPACT AND EFFICIENT water cooling system is one-third smaller than comparable air-cooled system for silicon rectifiers. Deionizing tank (circled) — acting like a kidney — constantly samples and purifies water in the system to maintain it at a resistivity of four million ohms per cubic centimeter. Entire cooling system is contained in rectifier cubicle manufactured by I-T-E Circuit Breaker Company, Philadelphia.

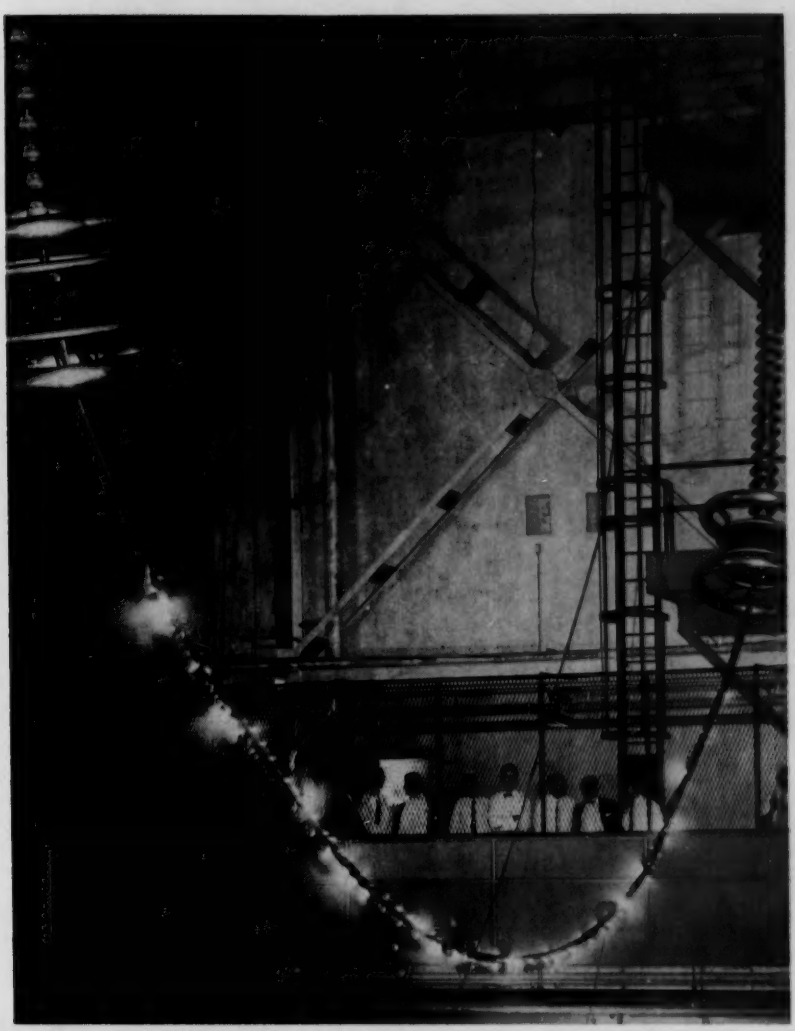


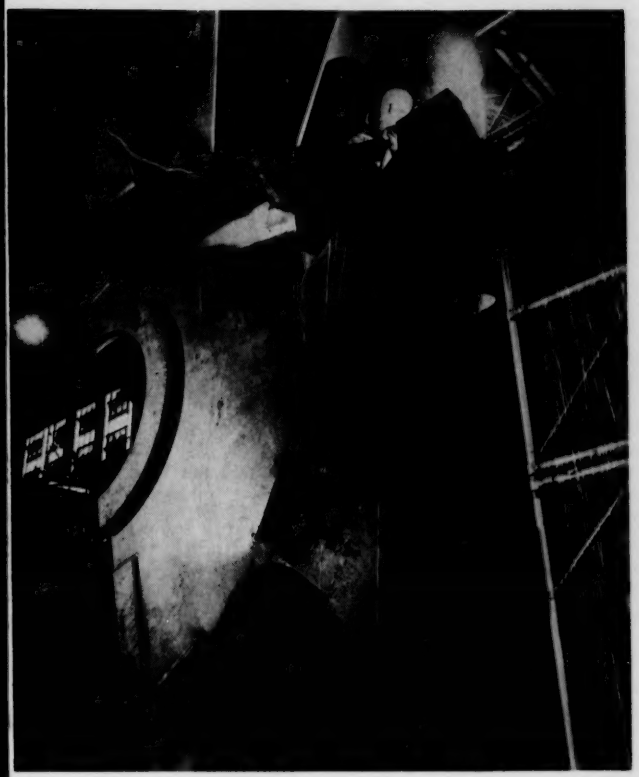
ELECTROSTATIC PRECIPITATOR MODELS were in operation at Western Precipitation Corporation's open house for members of the APCA who recently met in Los Angeles. In addition to these operating scale models the display included scrubbers and various types of filters.



ATOMIC ISLAND SETS SAIL — A man-made concrete island is being anchored on steel legs built into the bed of the Bristol Channel, England. It will pipe 35 million Imperial gallons of seawater an hour under the sea bed to Hinckley Point Atomic Power Station for the cooling of two reactors.

FIERY SKIP ROPE — This thick aluminum power cable is charged with half-a-million volts until it glows and crackles with escaping electricity (corona). Tests like this are part of the General Electric Project EHV — a 4½-mile extra-high-voltage transmission line near Pittsfield, Mass., that will carry power at 750,000 volts.





HEAVY 'SPIDER' — half of a 27-ft diameter water-wheel generator — is being fabricated at Westinghouse. The 25-ton piece will be joined with its matching half for installation in one of the thirteen 167,000-kva generators for the Niagara Power Project.

UNDER SEVERE ICE TEST, 7.5kv (left) and 34.5kv "Powerupters" on vertical-break switches opened after being frozen in closed position. The "Powerupter", a completely enclosed device for mounting on disconnect switches to interrupt currents of 600 amps was subjected to the tests in a freezer chamber simulating crucial field conditions by Delta-Star Electric Division, H. K. Porter Company, Inc.

Aluminum clad copper wire

Recently developed for high temperature magnet wire and a variety of applications in aircraft, missiles and high-speed industrial equipment is a high-conductivity wire, described in a technical booklet, combines the high-conductivity advantages of copper with the high temperature properties of aluminum.

The cladding, an aluminum alloy, equals a cross-sectional area of approximately 40 percent of the composite wire.

Highly resistant to corrosion, the wire is made by inserting a high conductivity copper core into an aluminum alloy tube. Between the copper rod and aluminum alloy tubing a protective barrier sheath is inserted.

This barrier retards oxidation and alloy formation of the core material thereby improving the electrical properties over extended periods of time at high temperatures.

("Aluminum Clad Copper 40%" booklet is issued by Sylvania Electric Products, Inc., Parts Division, Dept. P&PSE, Warren, Pa.)
Circle 9609 inside back cover.

Battery water direct from the tap

Four-page bulletin describes battery-water unit that converts ordinary tap water to pure battery water, by attachment to any water faucet. No heat or power is needed. The unit is compact having no valves or functional moving parts.

Ruggedly constructed, the device is suited for heavy duty service in all types of battery maintenance. An electronic purity selector permits selection of water purities from regular to premium quality control. Built-in signal automatically shows the end cut-off.

(Bulletin Series B59 is issued by A. E. Tomkin Co., Dept. P&PSE, 1507 M Street, NW, Washington 5, D.C.)
Circle 9610 inside back cover.

Power switching centers in building blocks

A concept in power switching centers — providing economy and flexibility through building block design — is subject of 20-page bulletin.

Detailed application and design information is written to aid contractors, consulting engineers and industrial application engineers in selecting and specifying 4.8 through 14.4kv power switching center equipment.

The building block concept incorporates standardized metal cubicles housing standardized components — fused interrupter switches, metering, lightning arresters and other primary switching components — in standardized arrangements which are assembled into load centers to meet user's requirements.

(Bulletin G-1616-A is available from I-T-E Circuit Breaker Company, Dept. P&PSE, 1900 Hamilton St., Philadelphia 30, Pa.)
Circle 9611 inside back cover.

Blower-vacuum cleaners

A complete line of portable blower-vacuum cleaners that have a variety of uses from salvaging metal to picking up small parts is described in 4-page folder.

Included are hand-portable units in 1-1/3, ¾, ½, and 1/3 horsepower sizes, a heavy duty tank-type model, a drum conversion unit for wet or dry pickup, a commercial "canister" type for dry pick-up only, together with more than eighty brushes, wands, sprayers, and other cleaning attachments.

By attaching a power unit to any standard 55 gallon steel drum, the drum conversion unit provides a highly efficient cleaner. The power cover assembly is easily detachable so that as one drum becomes filled, another can be substituted.

(Form No. A-559 is available from Ace-Sycamore, Inc., Dept. P&PSE, 448 DeKalb Avenue, Sycamore, Ill.)
Circle 9612 inside back cover.

PLANT and POWER SERVICES ENGINEER

"Have you come up with anything to counteract the H-bomb yet?"

Which mastic to use on refrigeration

Two-page bulletin gives guide specifications on fire-resistant mastic designed to give a smooth, jointless, vapor-sealing finish on insulation used on indoor refrigeration piping and equipment.

(Bulletin M-4-B is available from Benjamin Foster Company, Dept. P&PSE, 4635-37 W. Girard Avenue, Philadelphia 31, Pa.)
Circle 9613 inside back cover.

Air blast power circuit breakers

Twenty-page bulletin describes air blast power breakers for high-voltage circuit protection. Built for the full range of transmission voltages, the breakers are modular in design.

The breakers use a new pressurized interrupter and a new gas-insulated current transformer. A complete line of air-blast breakers, from 115- through 460-kv and even higher, can be supplied by connecting interrupting modules in series.

(Air Blast Power Circuit Breaker Bulletin GEA-6908 is issued by General Electric Company, Dept. P&PSE, Schenectady 5, New York.)
Circle 9614 inside back cover.

Bulletin describes cycle controller

A new improved impulse-sequence time-cycle controller that can have as many as ten pilots for controlling the timing of as many variables is described in 12-page bulletin.

The controller is offered with pneumatic pilots, electric pilots, or a combination. Variations of the basic model offer high-capacity pneumatic pilots, single- and double-pole switches, and special purpose switches.

(Bulletin C311 is issued by The Bristol Company, Dept. P&PSE, Waterbury 20, Conn.)
Circle 9615 inside back cover.

NEW LITERATURE

Oil and gas burner design explained

Pictorial folder describes mechanical pressure atomizing oil and nozzle-mix gas burner. Construction features and principle of operation are shown in three full-page wash drawings.

Flow of both main fuels and primary and secondary combustion air supplies are clearly pictured. Flame monitoring and control systems are shown in detail and labeled.

The burner is shown in the normal operating position and also with the burner assembly conveniently swung open, readily accessible for easy inspection and cleaning on its hinged mountings. A third view is from the fireside.

(Folder "Automatic Boilers" is issued by Boiler Engineering & Supply Co., Inc., Dept. P&PSE, Phoenixville, Pa.)
Circle 9616 inside back cover.

Conversion factors on wall chart

Containing common conversions such as inches to centimeters or watts to hp as well as many conversions that are difficult to locate in reference manuals, wall chart acts as handy reference for engineers.

(Wall chart of Conversion Factors is available from Precision Equipment Company, Dept. P&PSE, 4411 E. Ravenswood Ave., Chicago 40, Ill.)
Circle 9617 inside back cover.

Introduces dial-head time relay

Design for the dial-head time relay is described and pictured in 4-page folder.

Five achievements of the newly designed instrument are stressed as well as the old features of operation that have made it acceptable for numerous applications.

(Folder Form No. SR-10 is issued by AGA Division, Elastic Stop Nut Corporation of America, Dept. P&PSE, Elizabeth, New Jersey.)
Circle 9618 inside back cover.

Evaluating meter accuracies

A statistical evaluation of meter accuracy is detailed in 8-page bulletin. The publication provides a method of obtaining logical and useful conclusions from studies of meter accuracy data.

Publication explains the method and illustrates its application to practical metering problems.

(Bulletin GEA-5585A is issued by General Electric Co., Dept. P&PSE, Schenectady 5, New York.)
Circle 9619 inside back cover.

Whole evaporator story given in bulletin

Twelve-page bulletin tells the story of how an evaporator is produced — from design through machining to final assembly and inspection.

Profusely illustrated with pictures, drawings and photographs, the bulletin tells how evaporators produce high purity water.

(Bulletin HYT-101 is issued by Yuba Consolidated Industries, Inc., Dept. P&PSE, 350 California Street, San Francisco 4, Calif.)
Circle 9620 inside back cover.

Water rinseable paint remover

Development of a brush-on, water-rinseable paint remover that remains wet and workable for a day or longer and thus strips deeper and more completely is announced in two-page bulletin.

A single coating of the material is sufficient, in most cases, to remove up to ten layers of unwanted finishes such as paint, varnish, baked varnish, lacquer, baked enamel, air-dry synthetic enamel, and baked urea alkyd coatings.

(Bulletin No. 55-7 is issued by Turco Products, Inc., Dept. P&PSE, 24600 South Main St., Wilmington, Calif.)
Circle 9621 inside back cover.

CLASSIFIED SECTION

Plant-Power Services Engineer

CHEMICAL ENGINEER

Utility Power Plant Consultation

Thorough knowledge of chemistry involved in steam power plant design and operation. Experience in all phases of water treatment problems encountered in steam production and in circulating water and condensing systems. Also should have knowledge of service cooling, sanitary and potable water supply and production, sewage water re-use, saline water conversion, furnace chemistry corrosion. Must be capable of setting up treatment procedures, running equipment acceptance tests, preparing reports and instructing client personnel in the field regarding equipment operation and maintenance. Travel will be necessary on occasion.

If interested, send complete confidential resume including education, experience in detail, and salary expected to:

PERSONNEL RELATIONS DEPT.

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NEW LITERATURE

Mastics reference chart

General facts about standard line of mastics for protection of thermal insulation are present in handy reference chart contained in four-page bulletin.

Subjects covered in the chart include: brief description of the mastic, its coverage range, drying time, service temperature, flash point, flame spread index, average nonvolatile content, and water-vapor permeance.

Twelve different products for trowel or spray application are listed in the chart.

(Bulletin MRC is issued by Benjamin Foster Company, Dept. P&PSE, 4635-37 W. Girard Ave., Philadelphia 31, Pennsylvania.)
Circle 9622 inside back cover.

Mercury lamps and ballasts

Listings with explanatory comments of mercury lamps and ballasts, the auxiliary equipment used with them, and basic operating data are given in four-page technical publication.

(Technical Publication LS-103 is available from General Electric Company, Large Lamp Dept., Dept. P&PSE, Nela Park, Cleveland 12, Ohio.)
Circle 9623 inside back cover.

". . . it's a breeze . . . all I do is sit here and watch the boiler pressure go up and down . . ."

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THAT'S INTERESTING

Air conditioners go underground

Two absorption refrigeration machines that will provide air conditioning for the entire research staff of Gulf Research & Development Co., of Harmarville, Pa., will be placed in a vault underground and covered with landscaping.

The equipment, manufactured by Carrier Corp., will pipe chilled water for cooling through subterranean passages which are also used as all-weather walkways by employees. The machines were placed underground rather than mar the research center's campus-like atmosphere.

Guarded television

Guards use a closed-circuit television system to check personnel at a remote old gate at Gulf Oil Corporation's Girade Point Refinery in Philadelphia, Pa. One camera picks up split-screen image of face and badge and another keeps employee in view while passing through turnstile. When satisfied with identification, guard releases electrically operated turnstile.

Stove pipes in the air

"Flying stovepipes" may power tomorrow's supersonic passenger planes J. F. Drake of Marquart Aircraft Co. told members of ASME in St. Louis, Mo.

Ramjet engines, which gained the "stovepipe" nickname from their cylindrical shape and simple interiors are now being used to power guided missiles and experimental aircraft.

The factor of low initial cost coupled with greater fuel efficiency, simple fuel control, simple inspection and repair, elimination of lubrication problems, and lighter weight area are advantages of the ramjet.

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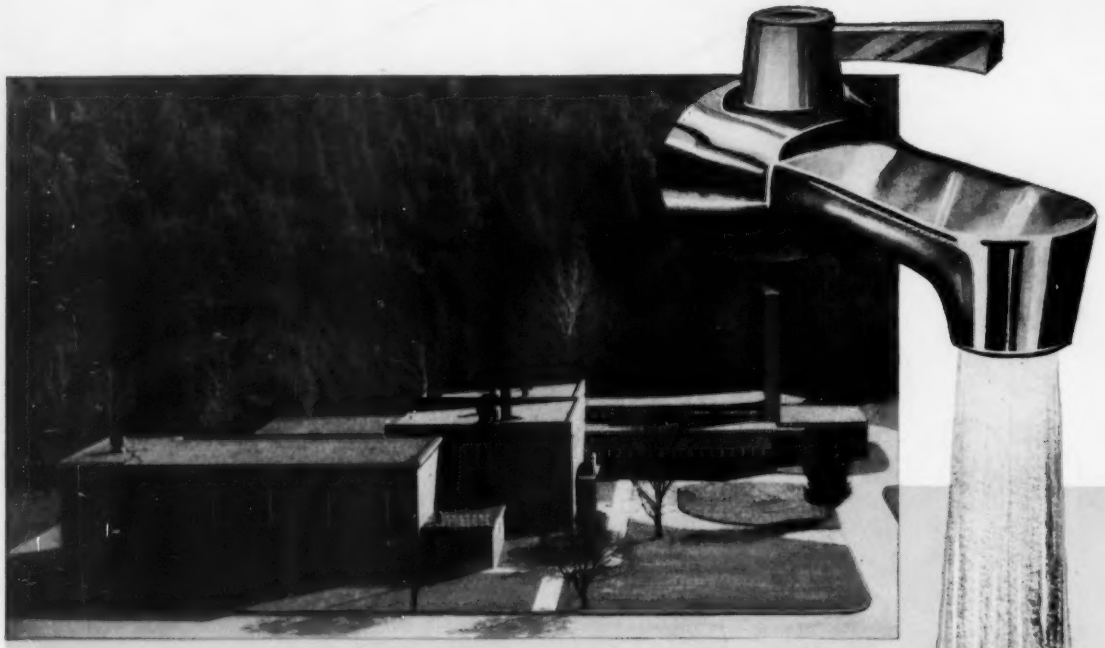

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Before using MOGUL, calcium formations were *actually visible* at the open end of faucets. A leaky faucet caused build-up of a calcium formation that was described as "hard as marble".

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MOGUL is proud of the "job well done" at Flintstone School. MOGUL is proud to be serving thousands of the nation's schools, colleges and universities as well as hospitals, hotels, public buildings and industrial plants of all types.

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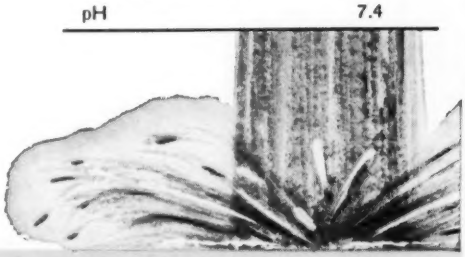
Sample	WATER ANALYSIS REPORT (expressed in ppm) No. 1
Total Hardness	2200
Calcium	1580
Magnesium	620
Silica	15
Phosphate	.5
Iron	0
Phenol. Alkalinity	0
Total Alkalinity	160
Chloride	7
Total Dis'd. Solids	1350
pH	7.4



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